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N.B.—Initialed reviews are written by the following:—

Dr. M. A. Keay	M. A. K.
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*General studies, see also individual crops.

C. A. B.
8 JUL 1953
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Plant Breeding Abstracts

Vol. XXIII, No. 3

* STATISTICS

1600 KELLER, E. R.
Beiträge zur Technik des landwirtschaftlichen Versuchswesens. III. Die Auswertung einfacherer Versuche. IV. Die Streuungszerlegung oder Varianzanalyse. (**Contributions to the technique of agricultural experimentation. Part III. Calculations of the results of simple experiments. Part IV. The analysis of variance**).
Schweiz. landw. Mh. 1952 : **30** : 179–85, 379–96.

Part III of this treatise (cf. *PBA*†, Vol. XXI, Abst. 2379) deals with the *t* test, and Part IV with the analysis of variance.

1601 NELDER, J. A.
Some genotypic frequencies and variance components occurring in biometrical genetics.
Heredity 1952 : **6** : 387–94.

Formulae devised by Mather to express linkage relationships in crosses of true breeding lines (cf. *PBA*, Vol. XIX, Abst. 2282) are generalized to cover the effect of *k* generations of selfing, or of back-crossing to one of the homozygotes, on the frequencies of genotypes containing two linked genes. The formulae are used to derive expressions for particular variance components.

1602 Über die Unsicherheit des Anbauversuches. II. (**On the element of uncertainty in crop experiments. II**).
Pajbjergfondens forsøgs- og forædlingsarbejde 1951 : 26–39.

Sources of experimental error are discussed with special reference to root crops. The main difficulty is to ensure uniform conditions as regards soil and to exclude variation due to the incidence of diseases and pests. Recommendations are made as to the best measures to eliminate sources of error as far as possible.

* GENETICS

1603 BOERGER, A.
Importancia del estudio de la genética. (**The importance of the study of genetics**).
Cienc. e Invest. 1952 : **8** : 113–18.

In reviewing the results of applying selection, conscious or unconscious, to domestic animals and plants, the author refers to *Arachis Nambyquarae* as being twice as productive as modern cultivated forms of *A. hypogaea*, and to the greater disease resistance of wild species of cassava and potato. Some achievements in plant breeding in South America are cited and the conclusion is reached that nothing in physical or genetical science conflicts with the principle of free will.

1604 KÜHN, A.
Entwicklung und Problematik der Genetik. (**Development and special problems of genetics**).
Naturwissenschaften 1953 : **40** : 65–69.

The salient points of genetical theory in the 50 years of its development are outlined, showing how the interest has passed from morphological characters to problems of metabolism, developmental physiology and evolution.

1605 **Carnegie Institute of Washington. Yearbook No. 50** : 1950–1951 : Pp. 260.

Bush, V. Report of the President. (*pp. 1–19*).

A few of the more important achievements selected for review include those resulting from cytological and genetical investigations.

Hiesey, W. M. Growth studies under controlled temperatures. (*pp.* 99–105).

Further studies of ecologically diverse forms of *Poa, Achillea* and *Mimulus* under controlled temperatures (cf. *PBA*, Vol. XXI, Abst. 1476) have demonstrated the opportunities available for investigating interactions between internal

* General studies, see also individual crops.
† Plant Breeding Abstracts.

genetic and physiological conditions and the environment. A survey of the range of tolerance of various *Poa* spp. and hybrids has shown that many hybrids combine the tolerance ranges of both parents; thus, some hybrids withstand widely contrasting temperatures as a result of their complex genetic composition.

Clausen, J. et al. *Climatic tolerance of* Poa *species and hybrids.* (*pp. 105–08*).

The results of field experiments in Europe and the USA have supported the findings of tests carried out at controlled temperatures in previous years. Races and hybrids which tolerate a wide range of greenhouse conditions are also capable of adaptation when transplanted to numerous environments. Thus it is possible to make an approximate estimation of the ecological characteristics of specific strains and their range of tolerance in nature on the basis of greenhouse experiments.

Clausen, J., Grun, P., Nygren, A. & Nobs, M. Genetics and evolution of Poa. (*pp. 109–11*).

Eight new strains of *P. ampla* x *P. pratensis* have been isolated at the Soil Conservation Nursery, Pullman, Wash. All eight strains grow vigorously and produce high yields of seed or succulent foliage. Each strain is more apomictic than the parent and will therefore remain more constant. Various interspecific crosses were undertaken to explore further the origin and evolution of many species. Several crosses involved species with low chromosome complements, since these are considered to be more primitive than species with higher numbers. Other crosses were effected to combine the desirable qualities of certain strains and to synthesize hybrids suited to the dry, warm, interior and southern parts of the USA.

Grun, P. Poa *cytology.* (*pp. 111–12*).

Further study of chromosome pairing has revealed that comparatively few univalents are found throughout the genus. Interspecific hybrids may have 4–17 univalents but most strains have only 1–7 unpaired chromosomes; thus chromosome behaviour does not appear to be sufficiently irregular to interfere with normal sexual reproduction.

Grun, P. Poa nervosa, *an extreme in asexual reproduction.* (*pp. 112–13*).

Over extensive areas in the USA this apomict has aborted anthers. Although it has apparently lost the normal means of maintaining the variability necessary for evolution, morphological differences were observed even within small areas. Experiments are in progress to determine the source of this variation.

Nygren, A. Embryology of Poa. (*pp. 113–15*).

From microscopic investigations of the developing embryos it has been possible to predict whether offspring of a particular plant or strain will be predominantly apomictic or reproduce sexually, giving rise to variable progenies. Considerable time may thus be saved by breeders of apomictic varieties (cf. Abst. 1982).

Davis, E. A. Photosynthetic investigations with Chlorella *mutants.* (*pp. 124–26*).

Results of further investigations with three ultraviolet-induced mutants are reported (cf. *PBA*, Vol. XXI, Abst. 1476). In strain 332, which liberates O_2 in the light, the genetic blockage affects the mechanism controlling CO_2 uptake, whereas the mechanism for liberating O_2 is blocked in strains 322 and 349. It is likely that the mutations in 322 and 349 affect different reactions. An extra pigment not present in normal cells was detected in one of the mutants unable to produce O_2; it is believed to be an altered xanthophyll.

Demerec, M. Department of genetics. (*pp. 167–74*).

A review of the research carried out by the department during the year mentions the work involved in organizing the 1951 Cold Spring Harbor Symposium on the theme of genes and mutations (cf. Abst. 5).

McClintock, B. Mutable loci in maize. (*pp. 174–81*).

The study of instability of genetic factors at various loci has been continued. A general survey of different mutable loci is presented in order to indicate the range of genetic expressions of this kind that can occur in a single organism, with special reference to the large number of loci that may be concerned. It is now known that mutable conditions of two distinct classes (cf. Abst. 5) can arise at any one locus.

Demerec, M. et al. *Bacterial genetics.* (*pp. 181–95*).

Most of these investigations on spontaneous and induced mutability, delay in the expression of induced mutations, the mutagenic effects of $MnCl_2$, the role of the bacterial nucleus in heredity, photoreactivation in bacteria and recombination in phages have already been summarized elsewhere (cf. *PBA*, Vol. XXII, Abst. 1649 and Vol. XXIII, Abst. 5).

Hershey, A. D., Roesel, C., Chase, M. & Forman, S. Growth and inheritance in bacteriophage. (*pp. 195–200*).

Analyses of genetic recombination and heterozygosis in phage T2H are reported (cf. Abst. 5).

Kaufmann, B. P., McDonald, M. R., Rowan, M. E. & Moore, E. C. Patterns of organization of cellular materials. (*pp. 203–15*).

Further understanding of the association of nucleic acids and proteins has been possible by treating salivary gland cells of *Drosophila* and onion root tips with trypsin. Degradation products of nucleoproteins behave as gels, which swell within the cell and cause cellular disintegration. Exposure to X rays reduces the swelling capacity of these gels.

1606 **Carnegie Institution of Washington. Yearbook No. 51** : 1951–1952 : Pp. 286.

Bush, V. Report of the President. (*pp. 1–20*).

Outstanding results of research in experimental taxonomy, cytology and genetics are among those included in a general survey of achievements during the past year.

Clausen, J., Hiesey, W. M., Grun, P. & Nobs, M. A. Survey of the range-grass program. (*pp. 107–11*).

The progress of the programme of hybridization since 1943 between desirable apomictic strains of *Poa* is outlined. Some of the most promising new apomicts have recently been obtained from crosses between *P. ampla* and *P. pratensis*; their tolerance of various environments has not yet been determined. From earlier crosses, 25–30 constant lines showing a wide range of adaptability have been selected for seed production trials. Apart from the practical value of some of the new strains, it is emphasized that the hybridization scheme has provided the opportunity for studying the function of apomixis and a high degree of polyploidy in evolution, and has clarified many taxonomic, cytogenetic and ecological aspects of the genus.

Clausen, J., Grun, P., Hiesey, W. M. & Nobs, M. A. New Poa *hybrids.* (*pp. 111–17*).

Details are given of the successful crosses undertaken in 1951 (cf. Abst. 1605). Particular attention is given to crosses involving the following: *P. caespitosa*, a vigorous native of Australia and New Zealand reproducing sexually; *P. arachnifera*, a diecious winter-hardy species which also reproduces sexually; and a 63-chromosome inland form of *P. scabrella* (usually $2n = 84$) with a high degree of drought resistance. Several quadruple hybrids were produced to determine whether apomictic hybrids behave genetically like natural apomictic species. The F_1 of (*P. scabrella* x *P. pratensis*) x (*P. ampla* x *P. alpigena*) exceeded both hybrid parents in vigour and foliage production. Taxonomically significant characteristics varied among the progeny, indicating some disintegration of the four original genomes and subsequent recombination.

Grun, P. Apomixis and variation in Poa nervosa. (*pp. 117–19*).

In spite of the necessity of fertilization of the polar nuclei for endosperm development in several apomictic species of *Poa*, it has been shown that normal seed formation occurs in *P. nervosa* ($2n = 60$) in the absence of pollen. Mitosis was found to be irregular in the endosperm; some cells with 120 and ca. 357 chromosomes were observed. Further analysis of variation within progenies of exclusively ♀ forms has been carried out in natural communities. The typical short ligule (1 mm.) of types in the Sierra Nevada was found to be replaced by a longer ligule, ca. 3 mm., where *P. nervosa* occurs together with the *P. Canbyi-epilis* complex, which is characterized by a ligule of 4 mm. This suggests that some of the variability within an apomictic species depends on genes introduced by pollen of other species.

Grun, P. & Triplett, E. L. Poa *cytology.* (*pp. 119–22*).

Meiosis was shown to be reasonably regular in *P. scabrella* ($2n = 84$), *P. pratensis* ($2n = ca.\ 68$) and their F_1 hybrid ($2n = ca.\ 75$), which was vigorous and morphologically intermediate between these contrasting sections of the genus. Self pollination of the F_1 gave rise to an F_2 of variable vigour. Only one F_2 individual showed normal bivalent formation, having $3{\cdot}4 \pm 1{\cdot}0$ univalents; the remainder had significantly more univalents, the highest number being $23{\cdot}7 \pm 3{\cdot}8$.

Chromosome counts of numerous recently developed hybrids are recorded. It is noted that both reduced and unreduced egg cells have been involved in producing interspecific hybrids. Different proportions of chromosomes from the ♀ parent produce additional morphological variability within F_1 progenies. Thus not only can widely diverse members of the genus cross to form vigorous, fertile, constant hybrids, but each cross can also give rise to several hybrid types. Such flexibility probably accounts for

much of the evolutionary success within the genus.

Hiesey, W. M. & Milner, H. W. Comparative physiology of ecologic races. (*pp. 131–32*).

Preliminary studies on the basic physiological characteristics of ecologically distinct races of *Poa* and *Achillea* are reported, relative to an understanding of mechanisms of natural selection in different environments.

Sorokin, C. & Myers, J. A high-temperature strain of Chlorella. (*pp. 141–42*).

During photosynthetic studies involving mass culture, several strains of *Chlorella* able to grow at 39° C were isolated. Normal strains of *C. pyrenoidosa* showed optimal growth at 25° C or less.

Milner, H. W. Growth of a high-temperature strain of Chlorella *at high density.* (*p. 142*).

Evidence is presented to show that one of the heat tolerant strains mentioned above has a considerable advantage over normal strains in culture at the high temperatures created by direct illumination.

Davis, E. A. Reversion of a photosynthetic Chlorella *mutant.* (*pp.* 147–48).

When cultures of the ultraviolet-induced mutants (cf. *PBA*, Vol. XXI, Abst. 1476) had depleted their supplies of carbon they became colourless. After six months both mutants unable to evolve O_2 were still colourless but several cultures of strain 332, capable of producing oxygen, had become green again. Transfers made to minimal media proved that reverse mutation to the wild type had occurred.

Demerec, M. Department of genetics. (*pp. 183–90*).

An outline of the work of the department is presented.

Demerec, M. et al. *Bacterial genetics.* (*pp. 193–205*).

Studies of induced mutations in B strains of *Escherichia coli* have progressed to the stage where the sequence of events occurring in cells exposed to a mutagen can be postulated. The specificity of certain mutagens for particular genes and the failure of some loci to respond to the action of mutagens have been demonstrated, with respect to genes determining aminoacid requirements. It is probable that the pattern of delay in the appearance of induced mutants is specific for the locus and is due to an induced change in the gene from a stable to a labile state. All the evidence indicates that the mutagens have an indirect effect on the genes, possibly through some change in metabolism, which affects the genome until the cell divides; in the meantime the genome may be modified by other agents (cf. Abst. 1701). Investigations on the effect of temperature on spontaneous and induced mutations have shown that spontaneous mutations are unaffected, but the yield of ultraviolet-induced mutants was smaller at 16° C than at 37° C; similar results were obtained when the low temperature treatment was given after irradiation but before the cells had divided. Various aspects of mutability at the locus responsible for streptomycin resistance have also been studied.

Hershey, A. D. & Chase, M. Initial steps in the reproduction of bacteriophage. (*pp. 205–07*).

Using radioactive isotopes of S and P, it was found that viral nucleic acid enters the host cell on infection, while the phage membrane containing most of the viral protein is left at the cell surface.

Visconti, N. & Coon, R. C. Recombination in bacteriophage. (*pp.* 207–12).

A quantitative theory of genetic recombination is outlined (cf. Abst. 1767), and details are given of methods by which the kinetics of a physiological change in infected bacteria conferring resistance to lysis can be studied. This acquired resistance to lysis has facilitated superinfection with numerous phage particles and enabled observations to be made on the mutual exclusion between related bacteriophages (cf. *PBA*, Vol. XXII, Abst. 2497).

McClintock, B. Mutable loci in maize. (*pp. 212–19*).

An hypothesis has been developed to account for the origin of different types of instability at a locus of known expression (cf. Abst. 5). It is assumed that two classes of functional genetic units are carried by the chromosomes: one is a fixed unit potentially capable of determining a particular reaction, whereas the other moves from one location to another within the chromosome complement and controls the potential reaction of the fixed unit. Some of the controlling chromosomal units appear to be specific in their effect on fixed units. Others are thought to consist of two units whose interaction depends on their relative positions. Data are presented on the instability of genic action under the control of a two-unit system, involving *Ac* at each of the loci associated with anthocyanin formation (*C*, *Bz*, *A*1 and *A*2), composition of

starch in pollen and endosperm (*Wx*) and morphology of the endosperm (*Sh*).

Kaufmann, B. P. et al. *Patterns of organization of cellular materials.* (*pp. 220–27*).

Analysis has shown that shrinkage of chromosomes after treatment with pepsin is due to the contraction of a partially hydrolyzed nucleoprotein gel and not to the selective action of the enzyme on a matrix protein. By treating salivary gland chromosomes of *Drosophila* with trypsin, their polytene pattern of organization has been demonstrated, and fibrous subunits have been distinguished with the electron microscope.

Cytochemical analyses of pycnotic nuclei in root tip cells of onion and broad bean which had been treated with chloranil and other chemicals have proved that agglutination and subsequent degeneration involve dissolution of nucleic acids and proteins (cf. Abst. 881). When seeds were treated with chloranil, germinating roots contained many polyploid cells and others with various structural aberrations.

Paigen, K., Kaufmann, B. N. & Wood, R. Cytoplasmic organization at the biochemical level. (*pp. 227–33*).

Conclusive proof has been obtained of the existence of three types of mitochondria with different enzymatic properties.

1607 Mehta, T. R.
Some aspects of genetics.
Agric. Anim. Husb. Uttar Pradesh 1950 : **6** : Sect. IV : 1–13.

A general discussion is given of three aspects: the fundamental cleavage between the concepts of Mendelian and Soviet genetics, disagreement with the latter being expressed; nongenic inheritance; and developmental genetics.

1608 Mangelsdorf, P. C.
Nikolai Ivanovich Vavilov 1887–1942.
Genetics 1953 : **38** : 1–4.

Vavilov's contributions to plant genetics are reviewed, with particular reference to his research on the centres of origin of cultivated plants and the geographical distribution of their wild relatives.

1609 Rose, S. M.
A hierarchy of self-limiting reactions as the basis of cellular differentiation and growth control.
Amer. Nat. 1952 : **86** : 337–54.

The author presents an hypothesis of cellular differentiation based upon the differentiation of cytoplasmic particles similar to tumour agents, comparing the process with the surface antigen system described by Sonneborn for *Paramecium*. It is suggested that differentiation involves the release of a general stimulus, upon which is superimposed successive inhibition of one gene-initiated reaction after another by the accumulation of specific metabolites in sufficient concentrations.

1610 Resende, F.
Change of dominance with flower development.
Portug. Acta Biol. 1952 : **3** : Sér. A : 287–89.

Changes in flower colour due to the transition of genes from an epistatic to a hypostatic condition, and *vice versa*, during floral development of interspecific *Aloe* hybrids at the Lisbon Botanical Institute are reported.

1611 Hallqvist, C.
Change of dominance in different genetic environments.
Hereditas, Lund 1953 : **39** : 236–40.

Two cases in which recessive homozygosity of one gene has resulted in a change of dominance in another pair of alleles are reported. In a study of flower colour of lupin, it was found that the presence of *rr* for the *albina* type of the whole plant resulted in the phenotypic similarity of *Ff* plants to *ff* individuals, *F* being a factor for full intensity of anthocyanin production. In barley, the combination $v_{II}v_{II}V_Iv_I$ had an *albina* phenotype resembling that of double recessives of the *virescens* genes for chlorophyll mutants. In $v_{II}v_{II}V_{III}v_{III}$ the change towards the *albina* type was not complete, since the presence of the single allele V_{III} could be detected in most cases by a minute green spot at the tip of the leaf, but the effect of this allele had become very considerably diminished in favour of v_{III}. In both lupin and barley, linkage could be excluded as an explanation. It is pointed out that in either case the genes involved have a reducing effect upon pigment production. The reducing effect of *r* and v_{II} may be especially strong, thus accounting for their ability to change the dominance of other genes.

1612 Oikawa, K.
(The determination of the mode of chromosome association at meiosis in hybrids).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 77–78. (Abst.). [Japanese].

A general analysis is given of the types of meiotic chromosome configurations observed in

hybrids obtained from crossing organisms with various degrees of chromosome affinity.

1613 BUTENANDT, A.
Biochemie der Gene und Genwirkungen. (**Biochemistry of genes and gene action**).
Naturwissenschaften 1953 : **40** : 91–100.
A review is given of recent work in which the genetical importance of DNA is demonstrated by evidence from a number of separate fields; the changed properties of virus mutants have been shown to result from changed constitution of the peptide chains in the protein molecule; differences existing in the DNA from different organisms have been demonstrated; and the majority of genes are seen to have the capacity to condition a specific protein, often though not necessarily an enzyme, as well as to reproduce themselves in their own image.

1614 MARQUARDT, H.
Karyotische Vererbung. Kerngesteuerte Vererbungserscheinungen. (**Caryotic inheritance. Genetic phenomena directed by the nucleus**).
Naturwissenschaften 1953 : **40** : 69–78.
In a review of the relationships between gene action and chromosome structure, data are cited to show that the same genetical effect may result from a variety of structural alterations, and the concept is arrived at that the gene controls a system of enzymes in its immediate vicinity, so that some structural alterations may affect these systems rather than the gene itself.

1615 REISSIG, J. L.
Genes y enzimas. El control hereditario del metabolismo. (**Genes and enzymes. The hereditary control of metabolism**).
Cienc. e Invest. 1953 : **9** : 3–19.
The main investigations on the genetics of biochemical characters in microorganisms are outlined, mentioning certain apparent cases of directed mutation and their practical and theoretical significance. The evidence examined lends support to the view that genes impress certain specificities upon the proteins which come in contact with them, thus engendering enzymes or antigens with specific biochemical properties.

1616 MICHAELIS, P.
Über die gleitende Veränderung des Plasmotypus. (**On progressive variation of the plasmotype**).
Biol. Zbl. 1948 : **67** : 32–44.
Interspecific hybrids between *Epilobium hirsutum* and *E. parviflorum* are described in which the morphology of the shoots varies considerably within single plants. This effect is ascribed to a corresponding variation in cytoplasmic factors.

1617 MICHAELIS, P.
Prinzipielles und Problematisches zur Plasmavererbung. (**Principles and problems in plasmatic inheritance**).
Biol. Zbl. 1949 : **68** : 173–95.
Cytoplasmic inheritance is discussed with special reference to assortment of plasmatic factors after hybridization and through competitive interaction during development.

1618 OEHLKERS, F.
Ausserkaryotische Vererbung. (**Extracaryotic inheritance**).
Naturwissenschaften 1953 : **40** : 78–85.
Reference is made to the experiments of Correns on plastid inheritance, predetermination for spiral direction in snails, dauermodification, somatic segregation and reciprocal differences in interspecific hybrids, including the *Streptocarpus* hybrids studied by the author, in which a balanced equilibrium between nucleus and plasma in respect of sex expression was demonstrated. These hybrids also provide cases of a gene for free petals which is manifested in the plasma of some species and not in others, presenting analogies with the killer factor in *Paramecium*. It is further pointed out that reciprocal differences have also been observed in crosses between strains within species, indicating that plasmon changes have occurred side by side with nuclear changes in the course of evolution.

VARIATIONS, MODIFICATIONS, MUTATIONS

1619 FASSETT, N. C.
Temporal variation.
Rhodora 1952 : **54** : 303–05.
It is pointed out that the morphological characters of homologous organs of a single individual may vary considerably with time. An example is quoted of the leaves of a tree in Indiana which resembled *Quercus rubra* in 1934 and *Q. palustris* in 1940.

1620 SCHILDER, F. A.
Methoden und Probleme der Biostatistik. IV. (**Methods and problems of biostatistics. IV**).
Biol. Zbl. 1948 : **67** : 189–200.
A method of representing the variability of a species is described. The percentage frequency

in the population of each combination of the characters considered is measured. The combinations are next grouped into horizontal arrays by virtue of some common characteristic and these horizontal arrays are then arranged into a vertical matrix taking care that the horizontal arrays most closely related are vertically adjacent. By indicating the frequency of each combination in its relevant position, and joining the peak frequencies between vertically adjacent arrays by means of connecting lines, the characteristic frequency distribution of the characters of the populations can be perceived in the eunomic series so indicated. The subordinate races which may become evident by this procedure are termed paraspecies.

1621 SCHILDER, F. A.
Methoden und Probleme der Biostatistik. V. (**Methods and problems of biostatistics. V**).
Biol. Zbl. 1949 : **68** : 244–52.

The curves representing the range of variability of various animal populations were found to be asymmetrical. The calculation of the arithmetic mean and standard deviation based on the assumption of a normal distribution is therefore unsatisfactory. Revised formulae are proposed as an alternative.

1622 SCHILDER, F. A.
Methoden und Probleme der Biostatistik. VI. (**Methods and problems of biostatistics. VI**).
Biol. Zbl. 1949 : **68** : 334–42.

Methods are described for assessing and representing the limits of variation for the 50% of the individuals of a biological population nearest the population mean for single measurable characters, pigmentation patterns, or two correlated characters.

1623 FINNEY, D. J.
The equilibrium of a self-incompatible polymorphic species.
Genetica 1952 : **26** : 33–64.

A mathematical analysis is presented of gene frequencies and equilibria in self incompatible polymorphic populations. Both zygote and pollen elimination are considered and both multiple allelic and multilocal polymorphic systems. The analysis is worked out in terms of the concept of isoplethy defined as the state in which a s-morphic population ($s \geqslant 2$) subsists when each of s_0 of its phenotypes ($0 \leqslant s_0 \leqslant s-2$) has zero frequency and the remaining ($s-s_0$) phenotypes have a frequency of $1/(s-s_0)$. It is shown that, in some polymorphic systems, gene equilibria are not maintained, the populations drifting in a direction in which one or more of the genetic components are eliminated, thereby converting the system into some other type, which may or may not subsist in equilibrium. The theoretical results are illustrated by reference to the polymorphic species *Oxalis rosea* and *Lythrum Salicaria*.

1624 NYBOM, N.
Some experiences from mutation experiments in *Chlamydomonas*.
Hereditas, Lund 1953 : **39** : 317–24.

Experiments were carried out on the biological and genetical effects of X rays and ultraviolet rays upon three sexual and heterothallic but morphologically isogamous species, *Ch. eugametos*, *Ch. Reinhardi* and *Ch. Moewusi*. The lethal effects of X rays and ultraviolet rays consisted of end-point and zero-point killing, respectively. Chemical protection against the action of either type of radiation occurred. Evidence of the phenomenon of photoreactivation was also obtained. Mutants with resistance to streptomycin or sulphonamide and nutritional and morphological mutants were induced. A few of the morphological mutants have been crossed with the normal type; they have all shown normal segregation.

1625 FREDRICK, J. F.
Preliminary studies on the synthesis of polysaccharides in the algae. III. Induction of polysaccharide variants in *Oscillatoria princeps* by low temperatures.
Physiol. Plant. 1953 : **6** : 96–99.

Variants occurring in cultures of *O. princeps* exposed to temperatures of 5° and 10° C showed diminished activity of branching enzyme, compared with the normal form in which the phosphorylating and branching enzymes are approximately equal in activity. Possibly a gene controlling the synthesis of branching enzyme mutated at 5° C, reverting to normal at 25° C.

1626 WEYLAND, H. *ET AL.*
Die Beeinflussung der Pflanzen durch chemische Substanzen. (**The influence of chemical substances on plants**).
Biol. Zbl. 1949 : **68** : 140–67.

Histological and morphological aberrations, some of them hereditary, were among the effects induced in plants by various aminoacids, polypeptides, vitamins, estrogens and carcinogens,

and by penicillin, miracil, colchicine and heteroauxin. The plants investigated were *Allium Cepa, A. Schoenoprasum, Aspidium Filix-mas* and *Cardamine hirsuta.*

1627 D'Amato, F.
Further investigations on the mutagenic activity of acridines.
Caryologia 1951–52 : **4** : 388–413.

In continuation of previous studies (cf. *PBA*, Vol. XXI, Abst. 41 and Vol. XXII, Absts. 51 and 924), investigations were carried out on the effects of a further 19 acridine compounds upon onion root tips. A mutagenic action was shown by 15, all of which behaved as typical inhibitors of mitotic preprophase. In addition to chromosome breakage, reunion and stickiness, metaphases with eroded chromosomes and "pulverized" anaphases were observed. Chromosome breakage and stickiness did not appear to be closely associated. Persistence of chromosome stickiness after the mitosis-free period in the recovery cycle sometimes occurred. Pseudochiasmata were again observed in the absence of stickiness. The author's previous hypothesis that the introduction of $-OCH_3$, $-Cl$, $-CN$ and possibly other radicals in the acridine molecule lessens or destroys the mutagenic effect was not confirmed. For many acridines, a parallel between antibacterial and mutagenic activity apparently exists.

1628 Stanton, W. R. & Sinclair, W. K.
The distribution of P^{32} in the plum and its mutagenic possibilities.
J. Exp. Bot. 1953 : **4** : No. 10 : 78–86.

Experiments on the uptake and distribution of P^{32} in plum trees representing several cultivated varieties are reported. The uptake in ten three-year-old trees cultured in sand ranged from 10 to 30%, and increased with tree vigour, measured in terms of weight. The highest concentration occurred in the growing regions, particularly in the buds. The mean activity in the shoots was 1·5 μc./grm. fresh weight, that in the terminal buds 3 μc./grm. The latter figure is approximately equivalent to a dose of 2000 r; this level of P^{32} activity is likely to produce mutagenic effects, but little sign of macroscopic damage to the buds was observed. Activity counts of digested samples showed a general agreement with results from surface surveys, suggesting the possibility of devising a technique of surface survey suitable for determining the dose in meristematic regions. P^{32} is regarded as having considerable advantages over X rays and other agents for the production of somatic mutations of possible economic value.

1629 Whaley, W. G.
The growth of reciprocal tomato-tobacco grafts.
Bull. Torrey Bot. Cl. 1953 : **80** : 26–32.

Results of work undertaken at the University of Texas with a local line of *Lycopersicon esculentum* designated 103 and a Havana type of *Nicotiana Tabacum* from Massachusetts are reported. Temporary differences in respect of height, stem diameter, leaf number and leaf size were noted between interspecific grafts and controls grafted on stocks of the same species. Except for the height advantage of the tomato on tobacco compared with tomato on tomato, none of these differences persisted to maturity. Contrary to the claims made by Avakian [Avakjan] and Jastreb (cf. *PBA*, Vol. XII, Abst. 82) and other Russian workers, neither of the genetic constitutions of the components were modified in any way by grafting.

1630 Dionigi, A.
Circa una nota sul determinismo ecologico di trasformazioni specifiche. (**Concerning an article on the ecological determinism of specific transformations**).
Riv. Ecol. 1952 : **2** : 201–11.

Referring to a recent article by Mathon (cf. *PBA*, Vol. XXII, Abst. 1601), it is suggested that the transformation of oats into *Avena fatua* may have resulted from a sudden frost which destroyed the oat seedlings and stimulated the germination of the *A. fatua*; and rye grains in wheat ears from destruction, again by sudden cold, of the anthers, followed by out pollination with rye pollen. An experiment is described in which a hybrid Akagamugi x (Wilhelmina x Rieti), which appeared to be a genetically pure, winter wheat, was converted into a spring wheat in two generations by spring sowing; it is suggested that the "transformations" referred to by Russian authors are similar cases of selection operating on a stock heterogeneous for the speed at which it passes from the vegetative to the reproductive phase.

EVOLUTION

1631 Small, J.
Evolutionary trends and classification.
Proc. Leeds Phil. Soc. 1951 : **6** : Pt. 1 : 1–3.

A brief recapitulation is given of the author's views on the nature of evolution as revealed by the fossil history of the diatoms (cf. *PBA*, Vol.

XVIII, Abst. 1393). It is emphasized that there is no paleontological evidence for the gradual change of one diatom species into another, nor for the view that diatom varieties are incipient species. Species appear to arise abruptly at a rate of about 1 per parent species per 7 million years.

1632 Small, J.
The time scale of organic evolution.
Irish Astr. J. 1952 : **2** : 21–26.

In this review of his theory of evolution (cf. Abst. 1631), the author points out that evidence has accumulated for many types of organisms on the longevity of species. The limit for the duration of a species appears to be *ca.* 100 million years; there appears to be no limit for genera. Species are divided into two categories, short-ranging species, which become extinct irrespective of favourable environmental conditions in *ca.* 1 million years or less, and long-ranging species, which may persist up to 100 million years. The statistical relations connecting the production and extinction of species and genera are recapitulated.

1633 Dmitriev, V. S.
(The origin of cultivated plant species with unknown wild ancestors).
Sovetskaja Agronomija (Soviet Agronomy) 1953 : No. 1 : 13–22. [Russian].

Lysenko's theory of conversion of some species into others (cf. *PBA*, Vol. XXI, Abst. 2500) is accepted as an explanation of the problem. Some familiar examples of conversions, reported in the USSR, are referred to. Mention is also made of research in the 'fifties, in France, by Fabre, who reported changes of *Aegilops ovata* into *Ae. triticoides* and of *Ae. triticoides* into *Triticum vulgare*. At the Institute of Genetics of the USSR Academy of Sciences, wild oat seed originating from the Kursk province gave wild oat plants, some panicles of which have borne a few normal oat seeds. They produced normal oat plants.

1634 Turbin, N. V.
(Darwinism and some new ideas of species).
Bot. Ž. (Bot. J.), Moskva 1952 : **37** : 798–818. [Russian].

Lysenko's recent evolutionary theories (cf. *PBA*, Vol. XXI, Abst. 2500) are rejected and Darwinist concepts of the origin of species and natural selection are accepted without qualifications. Mičurin, like Darwin and Timirjazev, is said to have regarded evolution as a process of slow cumulative changes without leaps. Hence, the application of the term "Mičurinite" to Lysenko's hypotheses is as unjustified as the assertion that Darwinism does not allow for qualitative changes or interspecific distinctions. The published facts upon which Lysenko founds his theory of conversion of one species into another (cf. *PBA*, Vol. XXI, Absts. 1792 and 2204, Vol. XXII, Absts. 1847 and 2589 and Vol. XXIII, Absts. 1501 and 1506), with the possible exception of the last two references, where the conversion of pine into spruce and hornbeam into hazel, respectively, are thought to have been possibly caused by natural vegetative hybridization, are not disputed, but their interpretation is. It is thought that the phenomena may be explained in several ways more acceptable than Lysenko's, for instance, by invoking interspecific hybridization or multiparental pollination. It is pointed out that no instances of conversions occurring in animal species have been reported and that no new plant species are known to have evolved by this method.

1635 Ivanov, N. D.
(The new theory of the species of T. D. Lysenko).
Bot. Ž. (Bot. J.), Moskva 1952 : **37** : 819–42. [Russian].

Lysenko's concept of the species and of interspecific and intraspecific relations and his theory of new species evolving by leaps from preexisting ones are regarded as incompatible with Darwin's evolutionary theory and with the tenets of the Marxist and Mičurinite classics, including Timirjazev and Mičurin (cf. Abst. 1634). Lysenko's recent theories are criticized for their Mendel-Weismann-Morganist content, and the hypothesis of interspecific conversion is compared to the mutation theory of formal genetics. It is stated that so far no new species have evolved by this method. Lysenko's principal errors are stated to be the rejection of (*a*) the Darwinian concept of overpopulation; (*b*) intraspecific competition and (*c*) natural selection. It is claimed that in these respects Lysenko holds similar views to those of Morgan.

1636 Sirks, M. J.
Variability in the concept of species.
Acta Biotheor., Leiden 1952 : **10** : 11–22.

The historical development of the concept of species is traced. Particular attention is given to the differences between the comparatively static concept, centred on the type specimen, and the more recently evolved dynamic concept of the biogeographer, dependent largely on

genetic analyses of populations and genome determinations.

1637 Bateman, A. J.
Self-incompatibility systems in angiosperms. I. Theory.
Heredity 1952 : **6** : 285–310.

The range of incompatibility systems is investigated, and two basic methods of interposing a physiological barrier between self pollination and self fertilization are distinguished: (1) a complementary relationship promoting the growth of pollen from genotypes unlike that of the style, and (2) an oppositional mechanism which inhibits the growth of like genotypes. Oppositional incompatibility has probably arisen independently many times, possibly evolving from a condition in which several loci produce weak antigens. Selection of nonspecific modifiers to increase the effectiveness of all loci, or of specific modifiers acting on one or two loci only, gradually improves the efficiency of the polygenic system. Possible interactions between alleles determining sporophytic and gametophytic control of incompatibility are discussed.

*CYTOLOGY

1638 Modilevsjkiĭ, Ja. S.
(A rapid method of differential staining for cytoembryological objects).
Bot. Ž. (Bot. J.), Kiïv 1951 : **8** : 27–30. [Ukrainian].

A method based on the substitution of aniline for clove oil as a solvent for various stains used in combination with fuchsine is described.

1639 Spencer, J. L.
Effects of intense ultrasonic vibrations on *Pisum*. I. Effects on root meristems.
Growth 1952 : **16** : 243–54.

The frequency employed was 500 kilocycles per sec.; the power was adjusted to 10 or 20 watts per cm.^{2} The cytological and histological abnormalities produced by subjecting the root tips of *P. sativum* to ultrasonic vibration increased with the duration of exposure. The nuclei of the meristem showed the greatest number and variety of aberrations; the root caps exhibited a greater amount of cellular disorder and cell-wall disruption than the other tissues. Those regions characterized by a high degree of vacuolization usually suffered the most severe disturbances.

1640 Spencer, J. L.
Effects of intense ultrasonic vibrations on *Pisum*. II. Effects on growth and their inheritance.
Growth 1952 : **16** : 255–77.

Exposure of *P. sativum* seeds for 20 seconds to ultrasonic vibrations of 500 kilocycles per sec. and a power of 20 watts per cm.^{2} resulted in a maternally transmissible increase in plant size (cf. Abst. 1639). The elongated plants of the treated, selfed and F_1 generations from non-elongated x elongated individuals had approximately twice the height and weight of the controls. The difference in height was due to an increase in cell length of the elongated plants. The developmental variation was accompanied by heritable physicochemical changes; elongated individuals had lower protease activity and lower percentages of crude fibre, total N and total P. The developmental change was probably a dauermodification.

1641 Caspersson, T., Fredriksson, T. & Thorsson, K. G.
A microplanimeter for measurement of endonuclear structures.
Hereditas, Lund 1953 : **39** : 201–08.

A description is given of a microplanimetric procedure for determining optical cross-sectional areas of very small objects such as the nucleus and nucleolus.

1642 Mirsky, A. E.
The chemistry of heredity.
Sci. Amer. 1953 : **188** : No. 2 : 47–57.

Research concerned with the localization of nucleic acids in the cell and providing evidence of the specific activity of desoxyribonucleic acid in transmitting hereditary characteristics is reviewed in a popular manner.

1643 Sharma, A. K.
Desoxyribonucleic acid—the problem of its function, location and reactions.
Portug. Acta Biol. 1952 : **3** : Sér. A : 289–317.

Various techniques used to demonstrate the location of desoxyribonucleic acid (DNA) *in situ* are reviewed. Although there is ample proof that DNA is present in the chromosomes, it is emphasized that no single cytochemical reaction is yet capable of determining the exact position.

* General studies, see also individual crops.

1644 Vincents Nissen, T.
Kerneproblemet hos Bakterierne. (The problem of the nucleus in the bacteria).
Nat. Verd., Kbh. 1952 : **36** : 312–17.
A review is given of the research that has been done on the structure and function of the nucleus in bacteria with observations on the different types of mutants that have been recorded.

1645 Sirks, M. J.
The earliest illustrations of chromosomes.
Genetica 1952 : **26** : 65–76.
Early research by Naegeli (1842), Hofmeister (1867), Russow (1872), Schneider (1873) and others on nuclear structure, after the first description of the nucleus by Brown (1833), is reviewed, with particular reference to the detection of chromosomes.

1646 Rattenbury, J. A. & Serra, J. A.
Types of nucleolus reconstitution in telophase and the question of the "nucleolar organizer."
Portug. Acta Biol. 1952 : **3** : Sér. A : 239–60.
From observations of different types of nucleolar formation in *Abies*, *Vicia* and *Allium*, it is concluded that fusion of prenucleolar substances is brought about by random protoplasmic movements. Since the chromosomal regions associated with the nucleoli are not exclusively concerned with coalescence, these regions should be termed nucleolar zones rather than nucleolar organizers.

1647 Caroli, G.
The effect of some oxyquinoline derivatives on pea chromosomes.
Agri Hort. Genet., Landskrona 1952 : **10** : 152–57.
An investigation of the effects of eight oxyquinoline derivatives on root tip chromosomes is reported. Only one derivative, 5-7-dibromo-8-hydroxyquinoline, proved more useful than oxyquinoline for determining chromosomal morphology without affecting the matrix. This derivative has also been used successfully in cytological analyses of certain grasses.

1648 Amaral, A. do
A propósito do "cromossômio." **(Concerning the "chromosome").**
Solo, Piracicaba 1952 : **44** : No. 2 : 19–39.
The author, in an erudite essay on the etymology of scientific terms, submits that the forms cromossoma and cromossômio are indefensible and the only admissible form is cromatossoma [chromatosome].

1649 Thoday, J. M.
The effect of ionizing radiations on the broad bean root. IX. Chromosome breakage and the lethality of ionizing radiations to the root meristem.
Brit. J. Radiol. 1951 : **24** : 572–76, 622–28.
Data are presented to show that genetic deficiency resulting from the division of cells containing aberrant chromosomes is an important factor determining reduction in growth rate after exposure to X and α rays. The estimated percentage of damaged cells is less than the percentage reduction in growth rate, particularly at high sublethal doses, but it is suggested that damaged cells, which tend to be disorientated, lead to the disorganization of meristematic tissue and thus contribute to the reduction in the rate of growth.

1650 Ellengorn, Ja. E., Gluščenko, I. E. & Afanasjeva, A. S.
(Genesis of the plant cell).
Dokl. Acad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **80** : 241–44. [Russian].
Amitotic reproduction in the cells of fruits and leaf petioles of the tomato, similar to that occurring in the cells of the petioles of *Hedera Helix* and in excised cubes of potato tubers (cf. *PBA*, Vol. XXII, Abst. 1618), was observed.

1651 Kimball, R. F., Geckler, R. P. & Gaither, N.
Division delay by radiation and nitrogen mustard in *Paramecium*.
J. Cell. Comp. Physiol. 1952 : **40** : 427–59.
Evidence is presented to show that X and ultraviolet rays and nitrogen mustard retard not only the first division following treatment but also the third, fourth and fifth subsequent divisions. The normal rate is regained by the sixth division. It is suggested that this pattern of effects may be of general occurrence.

1652 King, G. C.
"Diffuse" centromere, and other cytological observations on two desmids.
Nature, Lond. 1953 : **171** : p. 181.
The chromosomes of *Cosmarium botrytis* (n = 18) and *Pleurotenium kallis* (n = 104) have a polycentric or diffuse type of centromere organization, resulting in the parallel separation of the chromatids at anaphase. In both, the spindle is so truncated as to appear subrectangular in side view.

1653 Ziegler, A. W.
Meiosis in the Saprolegniaceae.
Amer. J. Bot. 1953 : **40** : 60–66.

Using the technique devised for *Allomyces* (cf. *PBA*, Vol. Abst. 134), meiotic configurations have been observed for the first time in several members of the Saprolegniaceae during germination of the oospores.

1654 Östergren, G. & Vigfusson, E.
On position correlations of univalents and quasi-bivalents formed by sticky univalents.
Hereditas, Lund 1953 : **39** : 33–50.

A study of meiosis in rye carrying B chromosomes and in *Lilium candidum* x *L. chalcedonicum* revealed that univalents belonging to the same chromosome pair are preferentially distributed on spindle arcs close to each other. Rye gave some evidence of nonrandom distribution of univalents; these tended to move to opposite poles. A coorientation of quasibivalents formed by sticky univalents was responsible. In one plant an additional mechanism with an opposite effect, possibly associated with asymmetry of the spindle, was detected. It is argued that the forces of secondary pairing will not cause association of univalents but will instead have the opposite effect.

1655 Forssberg, A. & Nybom, N.
Combined effects of cystein and irradiation on growth and cytology of *Allium cepa* roots.
Physiol. Plant. 1953 : **6** : 78–95.

Cysteine gave marked protection against the deleterious effects of X irradiation upon the growth of *Allium* roots, but its protection against damage due to α rays was very slight. When cysteine-treated roots were irradiated in nitrogen, only a slight additive effect of the two protective principles was obtained. The protective effect of cysteine against X irradiation was correlated with reduced cytological disturbance. The possible chemical nature of the protection afforded by cysteine is discussed.

1656 Kihlman, B.
Induction of chromosome changes with purine derivatives.
Symb. Bot. Upsaliens. 1952 : **11** : No. 4 : Pp. 96.

This paper comprises a fuller version of the results and conclusions already presented at some length in a previous report on the effects of purine derivatives on root-tip chromosomes of *Allium* and *Pisum* (cf. *PBA*, Vol. XXII, Abst. 2449).

1657 Kihlman, B.
8-ethoxycaffeine, an ideal inducer of structural chromosome changes in the root tips of *Allium Cepa*.
Exp. Cell Res. 1950 : **1** : 135–38.

Structural aberrations comparable with those induced by X rays were observed after treatment with 8-ethoxycaffeine, which shows a high degree of permeability and a low toxic effect (cf. *PBA*, Vol. XIX, Abst. 2359 and Vol. XXII, Abst. 2449).

1658 Wilson, G. B., Tsou, T. & Hyypio, P.
Variations in mitosis. II. The interrelation of some basic deviations.
J. Hered. 1952 : **43** : 211–15.

Five deviations from normal anaphase are discussed: (1) failure of cytocinesis, (2) split anaphase, (3) star anaphase, (4) segregational groupings, and (5) c-anaphase. This classification is based upon observations of the effects of colchicine or γ-cyclochlorohexane upon root tips of *Allium*. The different types are discussed in terms of the degree of spindle malfunction involved, and with respect to their consequences before and after cessation of the treatment.

1659 Mariani, P.
L'azione di escreti fungini sulla funzionalità delle cellule radicali. (**The action of fungal extracts on the functional capacity of root cells**).
Caryologia 1951–52 : **4** : 372–87.

Extracts of *Boletus rufus* inhibited mitosis when applied to the roots of wheat seedlings; in cells which had already started division, reversion of mitosis or c-mitosis occurred. After a certain length of time the roots seemed to be able to inhibit the toxic action.
Extracts from *Tricholoma* had a stimulating effect on mitosis.

1660 Bremer, G.
Enige opmerkingen naar aanleiding van het artikel van Ir C. Koopman, getiteld: Wat mogen wij van het verhogen van het aantal chromosomen verwachten? (**Some comments bearing on Ir. C. Koopman's article entitled: "What may we expect from increasing the number of chromosomes ?"**).
Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1952 : **9** : 69–70.

K., C.
Kort antwoord aan Dr. G. Bremer. (**Short reply to Dr. G. Bremer**).
Ibid 1952 : **9** : p. 70.

In the first of the above two articles G. Bremer

rebuts some criticisms by C. Koopman of the value of tetraploid rye (cf. Abst. 1822). In the second paper Koopman explains his attitude of cautionary criticism, while restating his belief that polyploid rye of practical value may be ultimately produced.

1661 Schwanitz, F.
Die Zellgrösse als Grundelement in Phylogenese und Ontogenese. (**Cell size as a basic element in phylogeny and ontogeny**).
Züchter 1953 : **23** : 17–44.

The greater size of cell and nucleus in polyploids is illustrated by a number of wild plants as well as many artificially produced polyploid and haploid plants. Exceptions are also mentioned and the actual situation is shown to depend on the genotype. The same applies to cell form, the size of chloroplasts and other organelles, fruits and other organs and the size of the whole plant. The increase in the size of the organs is generally not so great as that of the cell size, suggesting that the number of cells may be reduced in polyploids having increased cell volume; the number of leaves, flowers, fruits and other organs also tends to diminish in the polyploids. It is shown how the various factors associated with greater cell volume tend to exert an unfavourable influence on metabolism, and examples are cited of polyploids showing a reduced rate of various metabolic processes such as respiration, transpiration, germination, protoplasmic streaming, sensitivity in *Mimosa pudica*, growth of pollen tubes and degree of sexuality. Although polyploids with larger cells tend to have a lower osmotic value, this is more variable and may equal or even exceed that of the diploid, in which case they are more resistant to frost and drought. A number of polyploid species occurring in nature are cited, in which the *gigas* features are as strongly expressed as in new, artificially produced polyploids; others are cited in which the cultivated forms differ from the wild forms in typical *gigas* characters without there being any difference in chromosome number; in these too the *gigas* features are associated with greater cell volume, lower metabolic rate, reduced sexuality and all the other characteristics of *gigas* polyploids. The view is expressed that the change from small to large cells can occur by gene mutation as well as by polyploidy and instances are given where the mutation increases the size of the chromosomes without affecting their number. The view of the decisive importance of cell size is supported by observations of differences occurring during the ontogeny of the plant, large cells being characteristic of young tissues before they reach sexual maturity, and of tissues supplied with plentiful mineral nutrients.

1662 Nishimura, Y.
(**Chromosome doubling with Mercuron**).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 69–72. (Abst.). [Japanese].

Experiments with red pepper, radishes, *Brassica pekinensis* and *Chrysanthemum coronarium* have shown that Mercuron can be used for inducing polyploidy. It is too early to say, however, whether it would prove an effective substitute for colchicine.

1663 De Groote, R.
Scheikundige plantenveredeling met Gammexane. (**Chemical plant breeding with Gammexane**).
Cult. en Hand. 1951 : **17** : p. 122.

Evidence is cited from the work of Kostov (cf. *PBA*, Vol. XIX, Abst. 2378), D'Amato (cf. *PBA*, Vol. XXI, Abst. 86) and other investigators to demonstrate the value of the above substance for obtaining polyploid forms for Belgian horticulture and floriculture.

1664 Hindmarsh, M. M.
A critical consideration of c-mitosis with reference to the effects of nitrophenols.
Proc. Linn. Soc. N.S.W. 1951 : **76** : 158–63.

The need for a clear distinction between the specific c-mitotic action of colchicine on cells undergoing particular stages of division and the general toxic effect of nitrophenols on all dividing cells is emphasized, with particular reference to mitotic aberrations in onion root tip cells.

1665 Christiansen, W.
Polyploidie-Spektren. Statistische Untersuchungen an Pflanzengesellschaften in Schleswig-Holstein. (**Polyploidy spectra. Statistical studies on plant associations in Schleswig-Holstein**).
Biol. Zbl. 1949 : **68** : 369–84.

A positive correlation was discovered between the frequency of polyploids in a plant community and the severity of the environment in which it grows.

1666 D'Amato, F.
Polyploidy in the differentiation and function of tissues and cells in plants. A critical examination of the literature.
Caryologia 1951–52 : **4** : 311–58.

Literature on the occurrence of polyploidy in

different tissues is discussed, with reference to the cytological mechanisms causing polyploidization, and to the significance of polysomaty, from the physiological and other aspects. It is concluded that polyploid cells most commonly arise as a result of endopolyploidy, and that typically the plant body is chimerical, a mixture of diploid and polyploid cells probably being present in all tissues. The bibliography contains 173 references.

1667 Löve, A.
Subarctic polyploidy.
Hereditas, Lund 1953 : **39** : 113–24.

Out of the 511 indigenous and naturalized species composing the Icelandic flora, 65·8% are polyploids. Out of the 389 indigenous species, which survived the Pleistocene glaciations, 71·2% are polyploids; this figure represents 90% of the monocotyledons and 60·3% of the dicotyledons. The high frequency of polyploids in the endemic element is however regarded as coincidental. The mountain flora of Iceland does not show higher frequencies of polyploids than the lowland flora. The associations under the most extreme conditions of the unprotected clay flats have the highest frequency of polyploids; the protected snow patches showed the lowest frequencies. These observations are considered to support Gustafsson's hypothesis of the greater tolerance of polyploids of extreme climates in high elevations (cf. *PBA*, Vol. XVIII, Abst. 722).

1668 Lettré, H. & Lettré, R.
Zum Wirkungsunterschied von Desacetylcolchicin und Isodesacetylcolchicin. (**The difference in effect of desacetylcolchicine and isodesacetylcolchicine**).
Naturwissenschaften 1953 : **40** : 108–09.

The former compound was equal to colchicine in mitotic inhibition, the isomer was without effect.

SEX

1669 Yamaura, A.
(**The identification of sex, relationship and age by chemical means**).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 112–13. (Abst.). [Japanese].

Differences in the content of reducing enzymes in actively growing plant tissues, as determined by decoloration of a weak $KMnO_4$ solution, have been noted between the sexes of diecious plants, between strains with different degrees of polyploidy in the same species, between related species, between each of the parents of interspecific crosses and their hybrids, and between tissues of the same plant at different states of maturity.

1670 Burnett, J. H.
Oxygen consumption during sexual reproduction of some Mucoraceae.
New Phytol. 1953 : **52** : 58–64.

The observed rate of O_2 consumption of heterothallic species during sexual reproduction was over 10% greater than that expected from the summation of the rates of both mating types.

1671 Burnett, J. H.
Oxygen consumption of mixtures of heterothallic and homothallic species in relation to "imperfect hybridization" in the Mucoraceae.
New Phytol. 1953 : **52** : 86–88.

Small but significant increases in O_2 consumption (cf. Abst. 1670) were noted both in mixtures of heterothallic species and in mixtures of heterothallic and homothallic species reported to have developed nonfunctional gametangia-like structures. The data suggest that the initiation of sexual reproduction in both heterothallic and homothallic species is brought about by similar diffusible agents. Differences in O_2 consumption indicate that the agents responsible for normal reproduction and imperfect hybridization are not, however, identical.

*BOTANY

1672 Schwemmle, J.
Gibt es eine selektive Befruchtung? (**Does selective fertilization occur?**)
Biol. Zbl. 1949 : **68** : 195–231.

Oenothera Berteriana is an isogametic complex heterozygote carrying the complex B.l; *Oe. odorata* is a comparable type with the complex v.I. Reciprocal crosses between these two species showed that B.v zygotes are hardly ever obtained unless v is contributed by the ovum and B by the pollen. It is supposed that ovaries with B have no chemotropic effect on v pollen. This was confirmed by the discovery that the seed set of the cross B.l ♀ x v.I. ♂ could be increased by subsequent pollination with *Oe. argentinea*.

1673 Linder, R.
L'incompatibilité dans *Oenothera missouriensis* Sims. (**Incompatibility in *Oe. missouriensis* Sims.**).
Ann. Inst. Nat. Rech. Agron., Paris 1952 : **2** : Sér. B : 189–213.

Observations on the population of the above species in the Strasbourg Botanic Gardens show

* General studies, see also individual crops.

that *Oe. missouriensis* is self-incompatible—strictly so, in the case of old plants, but not entirely so, in some cases of young plants.
As in *Veronica* and *Nicotiana*, the incompatibility appears, in the material examined, to be conditioned by a series of at least four opposing multiple allelomorphs. The inhibitory reaction takes place in the upper part of the style.

1674 Moewus, F.
Zur Physiologie und Biochemie der Selbststerilität bei *Forsythia*. (**The physiology and biochemistry of self sterility in *Forsythia*).**
Biol. Zbl. 1950 : **69** : 181–97.
The heterostylic flowers of *F. intermedia* are self sterile after opening but self fertile in the bud. In the presence of boric acid, however, open flowers can be selfed. Self sterility is attributed to the presence in the pollen of substances inhibiting pollen germination, rutin in the pollen of short-styled plants and quercitrin in that of long-styled individuals. It is believed that the stigmas of short-styled plants contain enzymes inactivating quercitrin and conversely that the stigmas of long-styled plants can inactivate rutin. This arrangement would result in self sterility and cross fertility. Boric acid is believed to restore fertility by forming a chemical complex with the substances inhibiting pollen germination.

1675 Linskens, H. F.
Physiologische und chemische Unterschiede zwischen selbst- und fremdbestäubten *Petunien*-Griffeln. (**Physiological and chemical differences between self and cross pollinated *Petunia* styles).**
Naturwissenschaften 1953 : **40** : 28–29.
Styles of a self-sterile clone of *Petunia hybrida* increased their oxygen intake more after self pollination than after application of foreign pollen. However, after 12 hours the intake fell to normal whereas in the foreign pollinations it continued to rise. Electrophoretic estimations of protein in extracts from the styles showed the presence of two protein fractions in the selfed and only one in the cross-pollinated styles. This effect is thought to be analogous to the immunization reaction in animals.

1676 Lebègue, A.
La polyembryonie chez les angiospermes. (**Polyembryony in the angiosperms).**
Bull. Soc. Bot. Fr. 1952 : **99** : 329–67.
The author distinguishes pseudopolyembryony and true polyembryony and discusses the nature and origin of supernumerary embryos and the main genetic and other causes which may be presumed to lead to polyembryony.

1677 Miège, J.
Sur divers cas de polyembryonnie observés en Côte d'Ivoire. (**On various cases of polyembryony observed on the Ivory Coast).**
CR Prem. Conf. Internat. Africanistes Ouest 1950 : **1** : 486–95.
Instances of polyembryony, observed at Bouaké Experimental Station by the writer, in avocado, mango, cotton and *Eugenia Jambos* are discussed in the light of its occurrence in other genera.

1678 Lebègue, A.
Recherches sur la polyembryonie chez les Rosacées (g. *Fragaria* et *Alchemilla*). [**Investigations on polyembryony in the Rosaceae (g. *Fragaria* and *Alchemilla*)**].
Bull. Soc. Bot. Fr. 1952 : **99** : 273–75.
The author demonstrates by citation and examples from his own observation that true polyembryony is not as common as has been supposed and that within the same species more than one type of polyembryony may occur.

*DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

1679 Hauschild, I.
Epidemiologische Studien. Mathematische Untersuchungen über die Bedeutung der Infektionsresistenz und Toleranz für die Ausbreitung von Infektionskrankheiten und den Befallsgrad natürlicher Populationen unter besonderer Berücksichtigung der Kartoffelvirosen. (**Epidemiological studies. Mathematical investigations on the significance of resistance to infection and of tolerance for the distribution of infectious diseases and the degree of susceptibility of natural populations, with special reference to the potato viruses).**
Biol. Zbl. 1950 : **69** : 103–47.
The rate of spread of plant diseases is calculated for (*a*) diseases persisting throughout the life of the host and passing thence to the offspring; (*b*) permanent diseases that are not transmitted to the progeny; and (*c*) diseases from which the host may recover. In each case formulae are

* General studies, see also individual crops.

derived for plants whose vigour is unimpaired by infection (tolerance) and plants adversely affected by the disease (intolerance). It is pointed out that in plant breeding the usual requirement is a high degree of resistance accompanied by a low tolerance should a plant succumb to infection.

1680 Ryan, F. J.
Competitive suppression of prototrophs.
Nature, Lond. 1953 : **171** : 400–01.

Papers on the competitive suppression of prototrophs in microorganisms are discussed. The results point to the necessity of establishing in each case the reliability of the screening method employed. Grigg (cf. *PBA*, Vol. XXII, Abst. 1678) and Jinks (cf. Abst. 103) are criticized for implying that competitive suppression as a source of error has been neglected by investigators.

1681 Hollis, J. P.
On the origin of diseases in plants.
Plant Dis. Reptr. 1952 : **36** : 219–27. (Mimeographed).

An hypothesis of the origin of disease from nonreactive associations of microorganisms and higher plants is developed. It is suggested that in most cases the reactive condition originates from a nonreactive association by spontaneous mutation and biological selection. Ways in which rate of origin of new reactive combinations could be regulated are discussed.

1682 s'Jacob, J. C.
Voor de practische kweker bruikbare methoden van resistentie-onderzoek. (**Methods for the practical breeder's use in investigating disease resistance**).
Euphytica, Wageningen 1952 : **1** : 219–30.

Reliable methods for use by practical breeders in Holland, aided by the Netherlands Department of Research on Disease Resistance, are described for testing plant resistance to attack by the following fungi and eelworms: *Puccinia glumarum* f. *Tritici* on spring and winter wheat and on spring and winter barley; *Erysiphe graminis* f. *Hordei* on spring barley; *Ustilago Tritici* on spring and winter wheat; *Ustilago nuda* on spring and winter barley; *Melampsora Lini* on flax; *Phytophthora infestans*, *Fusarium coeruleum* and viruses X and A on potatoes; *Fusarium oxysporum* f. *Pisi* races I and III on peas; *Pseudomonas phaseoli* on beans; *Cladosporium fulvum* on tomatoes; *Peronospora Spinaciae* on spinach; *Heterodera marioni* on tomatoes; and *Ditylenchus dipsaci* on rye and clover.
The methods used by the institute in testing for resistance to potato wart and to virus diseases of strawberries and raspberries are mentioned as unsuitable for the practical breeder.

1683 Fraselle, J.
La sélection des plantes pour leur résistance aux maladies. (**Breeding plants for their resistance to diseases**).
Bull. Inform. INEAC 1953 : **2** : 1–4.

This popular article briefly instructs the reader on the basis of breeding for disease resistance from the biological and phytopathological aspects. Examples are given of resistance in various plants; and the role of environment and the possibility of the occurrence of new races of parasites are mentioned.

1684 Gäumann, E.
Problèmes d'immunité chez les végétaux. (**Problems of immunity in plants**).
Mém. Acad. Polon. Sci. Lettres, Cracovie 1950 (1952) : No. 17 : 1–18.

The mechanism of the defence reaction in plants, which is plasmatic or biochemical in nature, is discussed and compared with the corresponding phenomena in man. The writer concludes that, since the plant has no historical sense, it cannot acquire immunity but it can possess innate defence reactions.

1685 Manten, A.
Erfelijkheid bij bacteriën. (**Inheritance in bacteria**).
Vakbl. Biol. 1953 : **33** : 1–11.

In this review the writer discusses the work that has been done on variability in bacteria, transmutation, sexual reproduction and the inheritance of resistance to phages and toxic and other chemical substances.

1686 Hughes, W. H.
The origin of the L-form variants in anaerobic cultures of *Bacterium coli*.
J. Gen. Microbiol. 1953 : **8** : 307–09.

Under conditions approaching anaerobiosis, a single cell isolate produced a colony comprising three distinct cell types: normal cells giving rise to normal colonies; L-forms which reverted to normal if returned to nutrient broth; and intermediate types resembling normal cells but dividing to give one daughter cell capable of subsequent normal divisions and another daughter of the L-type.

1687 Norman, A.
Production of phenocopies in *Aerobacter aerogenes* by ultraviolet radiation.
J. Bact. 1953 : **65** : 151–56.
Information previously summarized is presented in a more detailed form (cf. Abst. 912).

1688 Bruner, D. W.
Induced variation in the g phases of somatic group B of the genus *Salmonella*.
J. Bact. 1953 : **65** : 222–23.
Further studies concerning the transformation of *Salmonella* species by antisera containing antigens specific for certain species are reported among bacteria carrying antigens of the g complex (cf. *PBA*, Vol. XXII, Abst. 94). Flagellate variants were produced by all the normally monophasic strains. Other variants included two forms of *S. derby* not yet found in nature. Strains identical with *S. essen*, *S. budapest* and *S. banana* were produced by *S. california* in the presence of different antisera, suggesting that the three species may have originated from *S. california*.

1689 Braun, W.
Studies in population changes in bacteria and their relation to some general biological problems.
Amer. Nat. 1952 : **86** : 355–71.
Recent investigations on population changes in bacteria are discussed, chiefly with reference to the selective effects of metabolites upon populations of *Brucella*. Parallels between the phenomena of selective changes in bacterial populations and such problems as antigenic transformation in *Paramecium*, developmental differentiation and neoplastic growth are discussed.

1690 Barber, M.
The effect of serial passage in other antibiotics on penicillinase-producing staphylococci.
J. Gen. Microbiol. 1953 : **8** : 104–10.
When certain strains of *Staphylococcus aureus* capable of inactivating penicillin were exposed to streptomycin or chloramphenicol, variations in the ability to produce penicillinase were noted. Results of investigations suggest that these changes were not caused by a specific effect on penicillinase production but became apparent because of (1) differences between the growth rates of the parent strains and the variants resistant to streptomycin or chloramphenicol, and (2) a tendency for antibiotics other than penicillin to select out naturally occurring penicillin-sensitive variants, particularly if the original strains were unstable in relation to penicillin.

1691 Knox, R., King., M. B. & Woodroffe, R. C.
The *in vitro* activity of isoniazid against *Mycobacterium tuberculosis*.
J. Gen. Microbiol. 1953 : **8** : p. vi. (Abst.).
M. tuberculosis MH37Rv was inhibited by less than 0·01 μ grm./ml. of isoniazid at 37°C; after 7 days' incubation, the gradual inactivation of the drug and the emergence of resistant variants combined to reduce this sensitivity. By raising the temperature to 40°C, however, growth was inhibited for a longer period as the selection of resistant mutants was suppressed.

1692 Kaplan, R. W.
Prüfung der Mutagenität ultraviolettbestrahlter Nukleinsäuren. (**Testing the mutagenic effect of nucleic acids irradiated with ultraviolet rays**).
Naturwissenschaften 1953 : **40** : p. 25.
Solutions of pure ribonucleic and desoxyribonucleic acids treated with rays of 2537 Å had no mutagenic action on *Bacterium prodigiosum*, a result which lends no support to the suggestion that they play a role in the mutagenic effect of ultraviolet rays.

1693 Davis, B. D.
Aromatic biosynthesis. IV. Preferential conversion, in incompletely blocked mutants, of a common precursor of several metabolites.
J. Bact. 1952 : **64** : 729–48.
Mutants of *Escherichia coli*, *Aerobacter aerogenes*, *Salmonella typhimurium* and *Bacillus subtilis* requiring two, three, four or five aromatic compounds have been shown to be blocked in the synthesis of precursors common to all five compounds. The multiplicity of the requirement depends on the completeness of the genetic block. Increasing inability to synthesize precursors leads to successive requirements for tyrosine, phenylalanine, tryptophane, p-aminobenzoic acid and p-hydroxybenzoic acid.

1694 Davis, B. D.
Aromatic biosynthesis. V. Antagonism between shikimic acid and its precursor, 5-dehydroshikimic acid.
J. Bact. 1952 : **64** : 749–63.
With the aid of a double mutant of *Escherichia coli* showing genetic blockages both before and after synthesis of 5-dehydroshikimic acid, it has

been shown that this substance interferes competitively with the utilization of its derivative, shikimic acid, preventing the successive conversion of the latter to tyrosine, phenylalanine, tryptophane, p-aminobenzoic acid, p-hydroxybenzoic acid and a sixth, as yet unidentified, aromatic compound. This order of preferential synthesis is the same as that inferred from studying the growth requirements of multiple auxotrophs with genetic blocks of varying completeness (cf. Abst. 1693).

1695 Kutzenok, A. & Aschner, A.
Degeneration processes in a strain of *Clostridium butylicum*.
J. Bact. 1952 : **64** : 829–36.

Morphological comparisons of colonies derived from normal and degenerate cultures have shown that the so-called degeneration is due to the production of R variants in S type strains. The outstanding physiological difference between S and R strains is the inability of the latter to reduce butyric acid to butanol. Since an acid medium enhances the growth of R cells, the S strain is at a selective disadvantage and gradually disappears.

1696 Elion, G. B. *et al.*
Purine metabolism of a diaminopurine-resistant strain of *Lactobacillus casei*.
J. Biol. Chem. 1953 : **200** : 7–16.

Comparisons between the diaminopurine-resistant mutant and the wild strain have led to the suggestion that the mutation has involved genes determining the activity of a single enzyme system controlling utilization of both adenine and diaminopurine, which are competitive antagonists in the synthesis of pentosenucleic acid.

1697 Cole, L. J.
Suppression of colonial variation in *Brucella abortus* by metal-complexing compounds.
J. Bact. 1952 : **64** : 847–53.

Versene, sodium citrate, sodium hexametaphosphate, 8-hydroxyquinoline and 8-hydroxyquinoline sulphate were found to suppress completely the occurrence of rough variants in 10-day-old cultures of a smooth clone of *B. abortus* strain 19. This suppression was, however, removed by the addition of Mn ions and, to a lesser extent by Mg ions (cf. *PBA*, Vol. XXII, Abst. 104). It is suggested that spontaneous mutation resulting in the formation of rough types from originally smooth cultures cannot occur in the absence of Mn ions. This hypothesis assumes additional interest in view of recent evidence for the mutagenic properties of $MnCl_2$ in respect of *Escherichia coli* (cf. *PBA*, Vol. XXII, Absts. 128 and 129).

1698 Barber, M.
Penicillin-resistant and penicillin-dependent staphylococcal variants.
J. Gen. Microbiol. 1953 : **8** : 111–15.

Four different types of penicillin-resistant variants were isolated after serial transference of strains of *Staphylococcus aureus* in penicillin. Two showed continuous variation (cf. *PBA*, Vol. XXII, Abst. 1660), with a gradual increase in resistance; this was lost equally gradually when the antibiotic was removed. The remaining types appeared suddenly, as if by a single mutation, and remained unchanged by further culture in increasing or decreasing concentrations of penicillin.

1699 Mitchison, D. A.
The occurrence of independent mutations to different types of streptomycin resistance in *Bacterium coli*.
J. Gen. Microbiol. 1953 : **8** : 168–85.

Four main types of streptomycin-resistant mutants were distinguished in a culture derived from a sensitive population by a single selective process. Each type occurred several times. These observations are considered to support the view that streptomycin-resistant variants exist in a sensitive population before selective contact has been made with the drug (cf. *PBA*, Vol. XXII, Abst. 2498). The only reasonable explanation for the occurrence of resistant colonies having identical characteristics is that the colonies were derived from a single mutant, which had divided several times before being exposed to streptomycin.

1700 Pittenger, R. C. & McCoy, E.
Variants of *Streptomyces griseus* induced by ultraviolet radiations.
J. Bact. 1953 : **65** : 56–64.

Aerial and submerged spores responded similarly to the lethal and mutagenic effects of radiation. The use of a screening technique for evaluating the antibiotic activity of single spore colonies demonstrated the high incidence of streptomycin-producing variants among survivors of heavy doses of ultraviolet rays. It was noted that the proportion of such variants generally decreased after photoreactivation. However, when a single suspension was exposed successively to five very high doses of ultraviolet rays, each followed by maximum photoreactivation, a relatively large number of variants was

obtained. Five variant strains giving higher yields of streptomycin than the parent in submerged cultures were isolated.

1701 Demerec, M. & Cahn, E.
Studies on mutability in nutritionally deficient strains of *Escherichia coli*. I. Genetic analysis of five auxotrophic strains.
J. Bact. 1953 : **65** : 27–36.

Results of a detailed genetical study of mutability of auxotrophs with particular growth factor requirements to the prototrophic wild types are presented. It was not possible to increase the rate of prototroph formation in two histidine deficient strains, H 12–33 and H 88,Sd–4, by treatment with either ultraviolet rays or $MnCl_2$. There is evidence, however, that not all histidineless strains are stable with respect to mutagens. In the three strains, M 12–11, MT 12–66 and L,P 12–72, in which reversions were induced, the delayed appearance of mutations was found to follow a pattern peculiar to each strain; the characteristic patterns were not a function of the mutagenic agents involved. These results show that delayed appearance of mutants is not explicable on the basis of the multinucleate condition of bacteria, diploidy, polyploidy, multistranded structure of chromosomes or variability in time of cell division, since each of these factors would result in an identical pattern of delay at all loci. It is considered that mutagenic agents may induce genomic instability, capable of persisting through several divisions, while each locus of the genome follows an independent pattern of behaviour.

1702 Knaysi, G.
The structure, division, and fusion of nuclei observed in living cells of *Mycobacterium thamnopheos*.
J. Bact. 1952 : **64** : 859–64.

Series of photomicrographs obtained with the phase microscope in dark contrast are reproduced to show that granules within *M. thamnopheos* divide, fuse and possess the structural organization typical of bacterial nuclei. Regardless of size or location, these granules resemble nuclei in their reaction to stains.

1703 Marshak, A.
Chromosome structure in *Escherichia coli*.
Exp. Cell Res. 1951 : **2** : 243–51.

Electron micrographs of large particles resulting from fragmentation by sonic vibrations show the presence of helical structures resembling the chromonemata of higher plants.

1704 DeLamater, E. D. & Woodburn, M.
Evidence for the occurrence of mitosis in the micrococci.
J. Bact. 1952 : **64** : 793–803.

A complete mitotic cycle, similar to that characteristic of higher organisms, is described in detail for the first time in *Micrococcus cryophilus*. Observations included elongation and contraction of chromosomes at different stages, chromosome doubling, appearance of centrioles and a visible spindle, formation of a cell plate and subsequent development of two daughter cells.

1705 Bisset, K. A.
Criticism of a technic claimed to demonstrate mitotic spindles in bacteria.
Stain Tech. 1953 : **28** : 45–48.

DeLamater's technique of staining bacteria with acid-hydrolysed thionin and dehydrating in freezing alcohol is criticized on the grounds that it causes considerable distortion, and produces stained artefacts derived from the transverse septa; it is considered that these artefacts have been confused with mitotic spindles by DeLamater (cf. Abst. 117).

1706 Bisset, K. A.
Do bacteria have mitotic spindles, fusion tubes and mitochondria?
J. Gen. Microbiol. 1953 : **8** : 50–57.

Cytological investigations on species of *Bacillus*, *Bacterium* and *Mycobacterium* have shown that recent demonstrations by DeLamater, Mudd and others (cf. *PBA*, Vol. XXII, Absts. 940, 1658–9, 2479 and 2481–2) of mitotic spindles, fusion tubes and mitochondria in these genera, are based on failure to recognize the basophilic growing points, septa and multicellular phases frequently found in bacteria. Misinterpretations are attributed to the use of nonspecific staining techniques and an unsuitable method of dehydration (cf. Abst. 117).

1707 Edward, D. G.
A difference in growth requirements between bacteria in the L-phase and organisms of the pleuropneumonia group.
J. Gen. Microbiol. 1953 : **8** : 256–62.

L-forms of species of *Proteus*, *Streptobacillus* and *Salmonella* tend to combine the growth characteristics of their normal parent types with those of the pleuropneumonia group. The latter group is however differentiated by a cholesterol requirement.

1708 Umbarger, H. E.
The nutritional requirements of threonineless mutants of *Escherichia coli.*
J. Bact. 1953 : **65** : 203–09.
Results of quantitative growth experiments with three threonineless mutants did not permit the postulation of a scheme relating the biosynthesis of isoleucine, valine and threonine.

1709 Dean, A. R. C.
Induced and other variations in bacterial cultures. V. The effect of ultra-violet irradiation on *Bact. coli* with special reference to nutritional mutations.
J. Chem. Soc. 1952 : 2817–22.
After irradiating strains previously adapted or unadapted to a simple synthetic medium containing ammonia as the source of nitrogen, 78 mutants having nutritional requirements of varying complexity were isolated. These are classified according to the number of aminoacids required.

1710 Dean, A. R. C.
Induced and other variations in bacterial cultures. VI. A comparison of the efficiency of the methods for isolating nutritional mutants.
J. Chem. Soc. 1952 : 2823–26.
Ultraviolet-induced nutritional mutants of *Bacterium coli* were isolated by the screening method used by Lederberg and Tatum (cf. *PBA*, Vol. XVIII, Abst. 1458) and by the penicillin technique devised by Davis (cf. *PBA*, Vol. XIX, Abst. 1634). Only one in every 19 strains isolated by screening was found to be biochemically deficient. The penicillin method was, however, more accurate; about one in every 8 isolated strains proved to be a nutritional mutant.

1711 Dean, A. R. C. & Hinshelwood, C.
Induced and other variations in bacterial cultures. VII. The stability of the nutritional requirements of the strains isolated after irradiation of *Bact. coli.*
J. Chem. Soc. 1952 : 2826–31.
Of the 78 mutant strains with varying nutritional requirements isolated after ultraviolet irradiation (cf. Abst. 1709), only two have proved stable. The others were trained to grow in the original simple synthetic medium again by processes varying from a single subculture in the presence of the nutritional requirement to numerous successive subcultures through progressively simpler media. It is suggested that the gradual adaptive repair of enzyme systems damaged by ultraviolet irradiation would be a more probable mechanism of recovery than reverse mutation.

1712 Rudman, D. & Meister, A.
Transamination in *Escherichia coli.*
J. Biol. Chem. 1953 : **200** : 591–604.
A presentation of evidence for the existence of two major transaminase systems includes an analysis of an isoleucineless variant, 42–37, with secondary growth requirements for valine and alanine. The genetic mutation in *E. coli* 42–37 is associated with enzymatic deficiency corresponding to the loss of one of the transaminase systems.

1713 Cavalli, L. L., Lederberg, J. & Lederberg, E. M.
An infective factor controlling sex compatibility in *Bacterium coli.*
J. Gen. Microbiol. 1953 : **8** : 89–103.
A further report of compatibility in *B. coli* is presented (cf. Abst. 921). It seems probable that the F^+ state, expressed merely as a compatibility relationship, is transmissible by infection with a virus-like agent (F) independent of λ, the latent phage of *B. coli* K–12. Difficulties encountered in attempts to isolate F from bacterial cells indicate that, under natural conditions, transference of F occurs by direct contact between cells. It is emphasized that visual support is needed for the hypothesis that recombination is the result of some form of cell conjugation. However, the data suggest a physiological difference in the gametic activities of F^+ and F^- strains, while progeny segregations demonstrate that the genetical contributions made by F^+ and F^- parents are distinct.

1714 Hayes, W.
Observations on a transmissible agent determining sexual differentiation in *Bacterium coli.*
J. Gen. Microbiol. 1953 : **8** : 72–88.
It has been found that the biochemical mutant 58–161 of *B. coli* K–12 which normally shows recombination with a gene acceptor strain, W–677, ceased to act as a gene donor after storage with the acceptor strain, but was compatible with wild type K–12 and prototrophic recombinant donor strains. Studies of mixed cultures of donor (F^+) and acceptor (F^-) strains, and analyses of progenies of the crosses $F^+ \times F^+$, $F^- \times F^-$ and $F^+ \times F^-$, have given results in general agreement with those obtained independently by Lederberg *et al.* (cf. Abst. 921).

A tentative theory of the mechanism of recombination is presented, assuming that F^+ is a nonlytic infectious agent, carried by F^+ cells but absent from F^- organisms. This agent becomes associated with some part of the chromosomes of a small proportion of the cells it inhabits, and is thus capable of transferring restricted groups of genes from F^+ to F^- individuals.

1715 Clark, J. B.
The effects of chemicals on the recombination rate in *Bacterium coli*.
J. Gen. Microbiol. 1953 : **8** : 45–49.

The addition of norleucine, colchicine, potassium nitrate and magnesium sulphate to nutrient media increased the rate of prototroph formation, by gene recombination, in cultures of two biochemical mutants, Y–53 and 58–161, of *B. coli* K–12. The rate of recombination was decreased, however, in the presence of sulphanilamide, sulphanilic acid, indole-3-acetic acid and sublethal concentrations of penicillin and streptomycin; this may be the result of a suppression of prototrophs by the parent auxotrophs (cf. *PBA*, Vol. XXII, Abst. 1678). All treated cultures were pleiomorphic and contained long filamentous cells. Conditions affecting the rate of recombination also influenced the proportion of filamentous cells, but no direct correlation was obtained.

1716 Wright, B. E.
The effect of alpha hydroxy acids on reversion of a glycineless *E. coli* mutant.
C.R. Lab. Carlsberg 1953 : **25** : 173–212.

In the presence of glycine and glycerol, the rate of reversion of a mutant of *Escherichia coli* requiring either serine or glycine was increased 20 times by the addition of l-tartaric acid, and 200 times by d-glyceric acid (cf. *PBA*, Vol. XXII, Abst. 942). Neither of these α-hydroxy acids have proved mutagenic to other organisms under similar conditions. The possibility that these substances specifically select reverted types, thus creating merely an apparent increase in the back-mutation rate, is discussed. Since neither substance supports the growth of the glycine dependent mutant in the absence of glycine, it is unlikely that either would influence the growth rate of the mutant while glycine was present. The author considers that changes in the biochemical environment of the individual may affect the mutability of a specific gene. It is conceivable that the α-hydroxy acids act as mutagens only for this mutant because of its particular metabolic pattern.

1717 Berger, H. & Wyss, O.
Studies on bacterial resistance to inhibition and killing by phenol.
J. Bact. 1953 : **65** : 103–10.

By selective methods, involving transfer to plates with successively increasing concentrations of phenol, a strain of *Micrococcus pyogenes* var. *aureus* resistant to the bacteriostatic action of 0·20–0·30% phenol was obtained. Phenol resistance was maintained through 40 transfers in nutrient broth. The resistant strain showed greater percentage survival in high concentrations of phenol if grown just previously in the presence of phenol than if transferred from nutrient broth alone. It is suggested that resistance was acquired by a series of mutations with superimposed adaptation.

1718 Kobus, J.
Niektóre cechy morfologiczne i fizjologiczne bakterii symbiotycznych roślin motylkowych. (**Some morphological and physiological characteristics of bacteria of symbiotic papilionaceous plants**).
Acta Microbiol. Polonica 1952 : **1** : 137–50.

Seven species of *Rhizobium*, comprising 25 of the Puławy strains obtained from various plants, showed marked differences in the morphological and physiological characteristics, not only of the individual species, but also of some of the strains within the species groups. In all strains the capacity to produce acids in media containing carbohydrates was correlated with resistance to crystal violet.

1719 Cavalli, L. L. & Maccacaro, G. A.
Polygenic inheritance of drug-resistance in the bacterium *Escherichia coli*.
Heredity 1952 : **6** : 311–31.

The process of gradual adaptation to increasing concentrations of chloromycetin was demonstrated using strains of *E. coli* K–12. From an initial tolerance of 1 γ/ml. chloromycetin, resistance to more than 1000 γ/ml. was achieved by successive transfers to increasing concentrations. Progenies of highly resistant x sensitive strains showed varying degrees of resistance intermediate between their parents indicating that chloromycetin resistance is determined by polygenes; the latter appear to be linked with other marker genes. Crosses between sensitive individuals and strains with slight resistance, attained after exposure to chloromycetin for a short time only, gave rise to segregating progenies comprising sensitive individuals and others

possessing only slight resistance. Crosses between different strains with slight resistance, however, resulted in recombination of the independent genes, so that offspring with greater resistance than either parent were produced. A certain proportion of sensitive bacteria also arose, showing that polygenes for resistance are nonallelic.

Although repeated selection within resistant lines tends to create increased resistance due to the positive interaction of many genes, it is emphasized that recombination between genotypes which have developed independently need not give rise to positive or additive interaction, in fact the resistance of recombinants may diminish.

1720 Lederberg, E. M. & Lederberg, J.
Genetic studies of lysogenicity in *Escherichia coli*.
Genetics 1953 : **38** : 51–64.

In an attempt to determine the genetical basis of lysogenicity, crosses were made involving lysogenic *E. coli* K 12, which carries the symbiotic phage λ, a sensitive strain lysed by λ, and two immune types resistant to λ but nonlysogenic. Crosses between similar types yielded only the parental type of offspring; progeny from lysogenic x sensitive, lysogenic x immune-1 and sensitive x immune-1 crosses showed segregation for both parental phenotypes. The segregation of lysogenicity has been confirmed by the synthesis of diploids heterozygous for lysogenicity; this characteristic appears to be linked with a capacity for galactose fermentation, determined by Gal_4. Linkage data are thought to justify the assignment of a new allele, Lp_1^+ (latent phage), to the locus controlling the maintenance of λ. Mutation from Lp_1^r (immune) or Lp_1^s (sensitive) to Lp_1^+ probably occurs when an individual becomes lysogenic, but the role of λ in the induction of lysogenicity is not yet clear. No evidence was found for the transmission of λ as a cytoplasmic agent.

During these investigations, λ mutated to a more virulent form, λ-2, which lysed λ-lysogenic bacteria; immune-2, however, proved resistant to this variant. A few more λ-sensitive strains of *E. coli* were isolated, but λ has not recurred.

1721 De Carlo, M. R., Sarles, W. B. & Knight, S. G.
Lysogenicity of *Bacillus megaterium*.
J. Bact. 1953 : **65** : 53–55.

The ability of virus infected *B. megaterium* strain l.o. to multiply itself and produce bacteriophages to which it is resistant was demonstrated. When spores of this lysogenic strain had been subjected to temperatures sufficiently high to inactivate free viruses and virus sensitive cells, they were capable of germinating on nutrient agar and producing more bacteriophages, thus demonstrating that lysogenicity may be transferred to subsequent progenies through the spore stage. Lysogenicity was lost by growing strain l.o. on 1·5% glucose agar or in submerged culture, when reversion to the uninfected sensitive parent type occurred.

1722 Smith, H. W.
The effect of physical and chemical changes on the liberation of phage particles by lysogenic strains of *Salmonella*.
J. Gen. Microbiol. 1953 : **8** : 116–34.

The fact that phage lysis can be induced in lysogenic strains by treatment with nitrogen mustard, mustard gas, sulphathiazole, glutathione and sodium thiolacetate is considered in relation to the mechanism by which transition from a resistant to a sensitive state occurs in the host. Since higher concentrations of thiolacetate than those causing lysis were shown to inhibit phage liberation, the change being reversible according to concentration, it is unlikely that lysogenicity is due to genetic mutation of either phage or bacteria. Lysogenicity, which is normal under natural conditions, probably depends on an unstable state of equilibrium between the host and an immature prophage; the term noninfective phage is preferred, instead of the latter, in order to contrast more effectively with the infective phage, causing lysis, which forms when the state of equilibrium is upset.

1723 Waggoner, P. E. & Wallin, J. R.
Variation in pathogenicity among isolates of *Phytophthora infestans* on tomato and potato.
Phytopathology 1952 : **42** : 645–48.

Four types of pathogen races are defined: pathic, hostic, environmental or developmental, according to the decisive factor associated with differential amounts of disease. Two hostic races of *Ph. infestans*, one from the tomato and another from the potato, were identified; the tomato race developed more rapidly and sporulated more copiously on tomato than the potato race. The two races were approximately equal in pathogenicity on the potato; these were each most often isolated from the host indicated by their name but could be isolated from the other

host. New hostic races could not be produced by culturing isolates from potato tubers on excised tomato and potato leaflets.

1724 Wood, J. L.
A cytological study of ascus development in *Ascobolus magnificus* Dodge.
Bull. Torrey Bot. Cl. 1953 : **80** : 1–15.

Evidence is presented to show that the haploid chromosome number is 8. None of the observations supported the theory of brachymeiosis, but similarities with nuclear divisions in higher plants were indicated.

1725 Pontecorvo, G., Roper, J. A. & Forbes, E.
Genetic recombination without sexual reproduction in *Aspergillus niger*.
J. Gen. Microbiol. 1953 : **8** : 198–210.

A technique for producing heterozygous diploids in filamentous fungi (cf. Absts. 129 and 130) has been applied to *Aspergillus niger*, which has no sexual cycle. Genetic analysis of recombinants produced mitotically by the synthesized heterozygous diploids has led to the identification of at least four loci. Apart from providing the opportunity for genetic investigations of imperfect fungi, Roper's technique may have practical implications for industrial fermentations using filamentous fungi. By creating heterozygous diploids from two strains with different properties, new stable strains with various recombinations of these properties or showing new characteristics can be developed.

1726 Yuill, J. L.
Culture study of an unstable strain of *Aspergillus niger*.
J. Gen. Microbiol. 1953 : **8** : p. i. (Abst.).

Descriptions are given of a stable mutant, T, with tan conidial heads; and an unstable mutant, B, with brown heads; both arose spontaneously from the black strain 868. Mutant B colonies develop black sectors from which colonies identical with strain 868 can be isolated; subcultures from brown conidia give further unstable brown colonies producing black sectors. The stable mutant T forms heterocaryons with the parent strain.

1727 Iguchi, N.
(Studies on *Aspergillus*. I. On mutation in *A. sojae* induced by ultraviolet irradiation).
Nihon Nogeikagaku Kai Shi (J. Agric. Chem. Soc. Japan) 1949 : **23** : 16–18. [Japanese].

Mutants differing from the parent stock in morphology, pigment production and enzyme activity were obtained.

1728 Iguchi, N.
[Studies on *Aspergillus*. II. On mutation in *A. sojae* induced by ultraviolet irradiation (continued)].
Nihon Nogeikagaku Kai Shi (J. Agric. Chem. Soc. Japan) 1950 : **23** : 357–60. [Japanese].

A further series of mutants of *A. sojae* is described (cf. Abst. 1727). One was characterized by extremely slow growth, and another by inability to utilize nitrate and nitrogen.

1729 Berk, S.
Radiation mutants of *Aspergillus niger*.
Mycologia 1952 : **44** : 723–35.

Mutants characterized by dwarf or giant conidial heads have been obtained from a monosporous line, FA 300, subjected to α radiation from polonium and radium.

1730 Jurkowska, H.
Zdolność przystosowania się kropidlaka (*Aspergillus niger*) do miedzi. [**The capacity of the black mould (*A. niger*) for adaptation to copper**].
Acta Microbiol. Polonica 1952 : **1** : 107–22.

A. niger, grown in a medium containing 0·44% of copper sulphate, showed toxic effects, e.g. decreased rate of development, delayed and feeble production of spores and decreased yield of mycelium. After sub-culturing many times, in separate amounts of the nutrient, adaptation to the particular concentration of the metal was shown by somewhat earlier germination and more vigorous growth of mycelium. Adapted and unadapted forms, grown separately in the above medium, showed morphological, physiological and biochemical differences. As compared with the unadapted form the adapted form is less sensitive to the sulphates of zinc, manganese and nickel, to chloride and nitrate of copper and to hydrogen ions, but develops more feebly than the unadapted form in nutrients of high sugar content.

When subjected to a series of subculturings in a medium without copper, the adapted form gradually loses its resistance to the toxic action of copper but even when adaptation is lost it retains some of its acquired morphological, physiological and biochemical characteristics and does not revert to its initial form.

1731 Kölmark, G.
Differential response to mutagens as studied by the *Neurospora* reverse mutation test.
Hereditas, Lund 1953 : **39** : 270–76.

Inositolless mutants of *N. crassa* have been

classified by Giles into five groups on the basis of their pattern of spontaneous and ultraviolet-induced reversion; the five groups may be considered as a series of pseudoalleles occupying the same locus (cf. Abst. 5). The author has found that treatment with a mixture of hydrogen peroxide and formaldehyde was more effective in group III of this material than in group II; the reverse was true in the case of ultraviolet irradiation; in both groups, however, ultraviolet rays were more effective than the mixture. Both groups II and III are characterized by a low rate of spontaneous reversion. In another experiment, inositolless mutants of groups I–IV showed a small but noticeable amount of reversion as a result of treatment with 1 : 2, 3 : 4-diepoxybutane, a mutagen which had a very strong effect upon the adenine locus (cf. Abst. 1735). Investigation of double mutants revealed that the dissimilarities in the response of the adenineless and inositolless mutants to the same treatment, either ultraviolet rays or 1 : 2, 3 : 4-diepoxybutane, are manifestations of primary differences between the two loci. The single adenineless and inositolless mutants have also differed in the amount of reversion induced by other chemical mutagens.

1732 Keitt, G. W.
Inheritance of pathogenicity in *Venturia inaequalis* (Cke.) Wint.
Amer. Nat. 1952 : **86** : 373–90.

Cytogenetical investigations carried out by the author and his collaborators on *V. inaequalis* are comprehensively reviewed, special attention being given to the methods devised for studying inheritance of pathogenicity. Two main types of pathogenic reaction have been encountered in monosporic wild-type lines: lesion and fleck. Six pairs of genes, each determining pathogenicity to a particular apple variety or group of varieties, have so far been identified; two of these pairs separately control pathogenicity to one variety (Yellow Transparent), the fleck allele of either pair being epistatic to the lesion allele of the other (cf. Abst. 141 and 932). Genetic combination is regarded as a major cause of the many biotypes of *V. inaequalis* with differential pathogenicity to apple varieties and other *Malus* spp.

1733 Fries, N.
Further studies on mutant strains of *Ophiostoma* which require guanine.
J. Biol. Chem. 1953 : **200** : 325–33.

Growth of the four guanineless mutants of *O. multiannulatum* described previously (cf. *PBA*, Vol. XIX, Abst. 2421) was shown to be considerably inhibited by adenine. Mutants 1365, 1370 and 1377 accumulated adenine when cultured with a limiting supply of guanine, but spontaneous mutations to hypoxanthine deficiency, in addition to the guanine requirement, occurred in all three strains. These double mutants were able to utilize adenine, removing the inhibitor from the substrate and thereby showed a selective advantage over their guanineless parents. Adenine was not accumulated by mutant 848, however, and it is considered significant that no spontaneous mutations to hypoxanthine deficiency were detected in this strain.

1734 Stevens, C. M. & Mylroie, A.
Inhibition effects in back-mutation tests with mutants of *Neurospora*.
Nature, Lond. 1953 : **171** : 179–80.

Under conditions commonly used in back mutation tests, several biochemically deficient mutants inhibited the growth of the wild type of conidia. The results therefore give some support to Grigg's criticism of the validity of back mutation tests (cf. *PBA*, Vol. XXII, Abst. 1678); dilution experiments with two of the mutants, one requiring p-aminobenzoic acid and the other leucine, did not however confirm Grigg's suggestion that use of mutant conidial suspensions with concentrations lower than the inhibitory ones might allow colonies of the wild type to appear. Growth inhibition of the wild type by the mutant conidia, it was concluded, may result in apparent mutation rates which are either higher or lower than the true values.

1735 Kölmark, G. & Westergaard, M.
Further studies on chemically induced reversions at the adenine locus of *Neurospora*.
Hereditas, Lund 1953 : **39** : 209–24.

Back mutations from adenine requirement to adenine independence have been induced in *N. crassa* by ethyleneimine, ethylene and two bis-epoxides. One of the latter, 1 : 2, 3 : 4-diepoxybutane, had a 20 to 30 times greater mutagenic effect than ultraviolet rays, X rays, mustard gas or other so-called strong mutagens. The other bis-epoxide, diepoxypropylether, was far less mutagenic than, for example, ultraviolet rays or mustard gas. Information, obtained mostly by the authors, on chemical and physical mutagens able to increase the back-mutation rate at the locus for adenine utilization is summarized; the data are discussed in relation to the possible nature of chemical mutagenesis.

1736 Singleton, J. R.
Chromosome morphology and the chromosome cycle in the ascus of *Neurospora crassa*.
Amer. J. Bot. 1953 : **40** : 124–44.

A detailed description of chromosome morphology both at pachytene and mitotic metaphase is supplemented by a series of photomicrographs. Synapsis of extremely contracted chromosomes was observed; this was followed by elongation, bringing the chromosomes to the form usual in other organisms at the beginning of pairing. Special attention is given to spatial relationships between the centriole and chromosomal centromeres. It appears that the small portion of the centriole having genetic continuity is concerned primarily with the spindle; the function of the latter, with respect to the arrangement of the nuclei in the ascus, is outlined and discussed.

1737 Haskins, F. A., Tissieres, A., Mitchell, H. K. & Mitchell, M. B.
Cytochromes and the succinic acid oxidase system of poky strains of *Neurospora*.
J. Biol. Chem. 1953 : **200** : 819–26.

An analysis of differences between the succinic acid oxidase system of a strain of *N. crassa* carrying the cytoplasmically inherited poky character (cf. Abst. 947) and of the wild type has shown that the young poky strain is deficient in cytochromes a and b and accumulates cytochrome c. With increasing age the poky strain becomes more like the wild type as the concentration of cytochrome b increases.

1738 Nason, A., Kaplan, N. O. & Oldewurtel, H. A.
Further studies of nutritional conditions affecting enzymatic constitution in *Neurospora*.
J. Biol. Chem. 1953 : **201** : 435–44.

Three mutants, 5269M, U 5 and U 25, requiring nicotinamide, adenine and methionine, respectively, accumulated diphosphopyridine nucleotidase when supplies of their growth factors were limited. In another methionine-requiring mutant, A 98, the high initial content of this enzyme decreased under conditions of methionine deficiency.

1739 Landman, O. E. & Bonner, D. M.
***Neurospora* lactase. I. Properties of lactase preparations from a lactose utilizing and a lactose non-utilizing strain.**
Arch. Biochem. 1952 : **41** : 253–65.

Identical properties are reported for lactase preparations from a normal strain of *Neurospora* and from the mutant 12016a, which is unable to utilize lactose as a carbon source but which shows lactase activity when grown on sucrose. It is suggested that gene mutation may have caused aberrations in the synthesis of lactase rather than alterations in enzyme specificity.

1740 Yčas, M. & Starr, T. J.
The effect of glycine and protoporphyrin on a cytochrome deficient yeast.
J. Bact. 1953 : **65** : 83–88.

Results of experiments have shown that the deficiency of catalase and cytochrome, characteristic of a mutant isolated after ultraviolet irradiation of a haploid culture of *Saccharomyces cerevisiae*, is a secondary result of an insufficiency of glycine, known to be a precursor of protoporphyrin. Genetic analysis indicates that the deficiency is dependent on a single gene.

1741 Pomper, S. & McKee, D. W.
Flocculence in yeast.
Science 1953 : **117** : 62–63.

Expression of flocculence may be variable in heterozygotes, depending upon the time of incubation and the kind and concentration of carbohydrate in the medium. The probability of scoring flocculent as dominant over nonflocculent increases with time of incubation and carbohydrate concentration. This effect of environmental factors may partly account for the discrepancies in the conclusions reached by different investigators as to whether flocculence or nonflocculence is dominant (cf. *PBA*, Vol. XX, Abst. 142 and Vol. XXI, Abst. 2402).

1742 Lindegren, C. C.
Concepts of gene-structure and gene-action derived from tetrad analysis of *Saccharomyces*.
Experientia 1953 : **9** : 75–80.

The author points out the need for a fundamental modification of Mendelian theory in order to interpret the results of tetrad analysis, with special reference to the genes controlling sugar fermentation. He assumes that the gene carries a large number of transmissible components arranged in a circle around the chromosome (cf. p. 159 above). It is possible that these particles may be unevenly distributed by longitudinal splitting of the chromosomes. The proximity of the loci of *MZ*, *MA*, *MG*, *ME*, *GA* and *SU* is discussed in respect of the probability that these enzyme-template genes have a common origin (cf. Abst. 949). The transmissible components of these genes are

considered to be mirror images of certain substrates. An investigation of the multiple alleles at the *MZ* locus has shown that the production of an enzyme involves a reaction between the adaptive substrate and a receptor on the surface of the gene; stimulation by the substrate initiates enzyme production. The multiple alleles correspond to a series of specifically deformed receptors which limit the capacity to respond to the stimulating effects of different substrates. To contrast with the plasmagene theory (cf. *PBA*, Vol. XVIII, Abst. 1458), the author emphasizes that an enzyme is not a duplication of a particular gene.

1743 Mosiašvili, G. I.
(Descriptions of rough and smooth forms of some strains of yeasts for making wine).
Mikrobiologija (Microbiology) 1951 : **20** : 314–19. [Russian].

Pure strains of *Saccharomyces ellipsoideus*, Kahuri 5, Kahuri 10 and Steinberg 1892, segregated into rough and smooth forms when used in wine making at Telavi, Georgia. The morphological and biological differences between these forms are described. The wine made with the rough forms had a higher percentage of alcohol and was of better quality than that made with the smooth types.

1744 Kudrjavcev, V. I.
(Continuous breeding of microorganisms in industry).
Mikrobiologija (Microbiology) 1951 : **20** : 155–67. [Russian].

The method of maintaining museum cultures of microorganisms for industrial uses is criticized because they are unadapted to changes in environment and soon become inactive and incapable of competing with other biological forms. Continuous selection under industrial conditions is advocated as a Mičurinite alternative. Mention is made of several yeasts which have been obtained in this way in the USSR. A scheme of selection is outlined. Reference is made to the probable advantage of combining several yeast strains to form a mixture. Hybridization and directed training of microorganisms are recognized as useful breeding methods.

1745 Bogdanov, V. M.
(The principles of breeding microorganisms).
Mikrobiologija (Microbiology) 1951 : **20** : 363–64. [Russian].

The Mičurinite breeding methods for microorganisms set forth by Kudrjavcev (cf. Abst. 1744) are supported.

1746 Kosikov, K. V.
(Breeding yeasts by hybridization and directed changes).
Mikrobiologija (Microbiology) 1951 : **20** : 365–77. [Russian].

Hybridization and environmental training are regarded as more efficacious methods than continuous selection under industrial conditions, as advocated by Kudrjavcev (cf. Abst. 1744). The method of preparing pure cultures introduced by Hansen has, it is stated, been a great achievement, despite the fallacies inherent in formal genetics. Several improved strains of yeasts, selected from pure cultures in the brewing, wine making and baking industries, are mentioned. Sexual hybridization of yeasts with subsequent vegetative reproduction of the F_1 is considered the most promising method of developing new active strains for industry. Experiments have shown that the hybrids remain constant and transmit their new properties to their vegetative progeny. Vegetative reproduction of the F_1 presents no practical difficulty. Alternatively, the hybrids can be selected in the F_2 and improved by environmental training. Hybrids bred by the author from *Saccharomyces carlsbergensis* x *S. globosus* included some that were capable of fermenting maltose but not sucrose. These were improved by environmental training and gave a new constant strain, 131 K, at the Institute of Brewing. Another promising method of developing yeasts with desirable properties is by training strains upon media with varied concentrations of nutrients or upon media with filtrates from other biological forms. Using these methods, forms of *S. globosus* capable of fermenting sucrose were obtained.

1747 Leščinskaja, S. S.
(The principles of breeding microorganisms).
Mikrobiologija (Microbiology) 1951 : **20** : 378–79. [Russian].

At Kiev, the pure yeast strains XII and Ja., used in the manufacture of alcohol, deteriorated when grown continuously from strains maintained in museum culture. Changes in Hansen's method of culturing yeasts along the lines suggested by Kudrjavcev (cf. Abst. 1744) are welcomed.

1748 Mosiašvili, G. I.
(Continuous breeding of microorganisms in industry).
Mikrobiologija (Microbiology) 1951 : **20** : 452–53. [Russian].

At the Institute of Viticulture and Wine Making,

Telavi, some pure strains of yeasts deteriorated when maintained in museum culture for long periods. Mention is made of some substitutes found for several degenerated yeast strains of the Rkaciteli type and for a strain which was previously capable of high enzymic activity. Changes in yeast selection and museum culture, as advocated by Kudrjavcev (cf. Abst. 1744), are accepted.

1749 Šamis, D. L.
(Continuous selection of yeasts in industry).
Mikrobiologija (Microbiology) 1951 : **20** : 454–55. [Russian].

Directed training and hybridization are regarded as more efficacious methods of producing new active strains of yeasts than selection. In this connexion some details of the selection scheme put forward by Kudrjavcev (cf. Abst. 1744) are criticized. The principles of continuous selection of new active yeasts and their substitution for museum cultures, which after a short period of time lose some of their desirable properties, are approved.

1750 Siliščenskaja, O. M.
(Continuous breeding of micro-organisms in industry).
Mikrobiologija (Microbiology) 1951 : **20** : 456–59. [Russian].

Directed training and hybridization are regarded as more promising methods of developing new yeast strains for alcoholic fermentation than selection (cf. Abst. 1744). Trials at the Institute of Alcohol Industry of many strains selected in recent years under industrial conditions showed that none of them differed appreciably from the museum cultures XII, M, P and Ja. These cultures had been previously obtained by selection.

1751 Čekan, L. I.
(Continuous breeding of micro-organisms in industry).
Mikrobiologija (Microbiology) 1951 : **20** : 460–64. [Russian].

Maintaining pure strains of microorganisms in museum culture has no deleterious effect upon their economic properties, when the media upon which the strains are grown correspond to their biological requirements. The use of standard media, without testing their effects upon definite microorganisms, should be avoided. Normally, yeasts and fungi thrive upon media which have a beneficial effect upon their enzymic properties. Sometimes, however, this is not the case. For instance, *Saccharomyces acidophilus* grows well in must or sugar solutions and *Aspergillus Oryzae* in sugar solutions, but the former loses its capacity for fermenting acid fruit juices and the latter for breaking down starch. Some arguments against continuous selection of microorganisms in industry (cf. Abst. 1744) are presented. Various methods of improving pure strains, including selection of wild and industrial microflora, directed training and hybridization, are mentioned.

1752 Leščinskaja, S. S.
(The effect of industrial conditions upon the improvement of the fermenting properties of yeast strains producing alcohol).
Mikrobiologija (Microbiology) 1951 : **20** : 525–33. [Russian].

Culturing yeasts under industrial conditions for a long period of time results in an improvement in their fermenting properties. This is attributed to adaptation of the microorganisms to their environment and to natural selection. Some facts supporting this thesis were obtained in experiments with pure industrial strains of yeasts XII and Ja.
Andruševskiĭ, Uladovskiĭ and Ivanjkovskiĭ strains of yeast Ja, causing more active alcoholic fermentation than the museum-cultured strain, have been selected. Extensive introduction of Andruševskiĭ, the most active new yeast, into industry is advocated.

1753 Veselov, I. Ja.
(Breeding and growing the spores of industrial microorganisms).
Mikrobiologija (Microbiology) 1951 : **20** : 550–55. [Russian].

Maintaining pure strains in museum culture and their directed training under laboratory conditions are regarded as more effective breeding methods than continuous selection of industrial microorganisms (cf. Abst. 1744). In this connexion Kudrjavcev's scheme of selection is criticized. However, selection has given some good strains of microorganisms, several of which are mentioned.

1754 Feniksova, R. V.
(The question of continuous breeding of microorganisms in industry).
Mikrobiologija (Microbiology) 1951 : **20** : 556–60. [Russian].

Heritable changes, including intensified capacity for breaking down starch, were obtained in *Aspergillus niger* by culturing it upon the cell sap of *A. Oryzae*. A detailed study of the new forms is in progress at the USSR Institute of

Alcohol Industry. In alcohol making, directed training of microorganisms is regarded as a more promising method than continuous selection, advocated by Kudrjavcev (cf. Abst. 1744). Kudrjavcev's claims that microorganisms degenerate when cultured in museums for long periods, and acquire new desirable properties when used continuously in industry, are rejected. Neither principle applies to strain XII of *Saccharomyces cerevisiae*, which is used extensively for making alcohol.

1755 Kosikov, K. V.
(Directed variability of the enzymic properties of yeasts caused by specific substrates).
Dokl. Acad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **80** : 105–07. [Russian].

Some *Saccharomyces globosus* strains became capable of fermenting sucrose, when cultured in a nutrient solution of 6% sucrose, 0·75% glucose and 0·5% extract from yeast cells disintegrated by the action of autogenous enzymes. The directed changes are regarded as being due to the specific substrate. No spontaneous mutations occurred in *S. globosus* cultured upon lactose.

1756 Mosiašvili, G. I.
(New races of yeast for making natural dessert wines).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1952 : No. 11 : 12–13. [Russian].

At the Georgian Institute of Viticulture, Kardanahi 30, 32 and 33, which are capable of fermenting grape juices with a 30–32% sugar content, have been selected.

1757 Lindegren, C. C.
The mechanics of budding and copulation in *Saccharomyces*.
Exp. Cell Res. 1951 : **2** : 305–11.

Detailed observations of both processes provide evidence that the cytoplasm, centrosome, centrochromatin and nuclear membrane are autonomous and self-reproducing. The capacity for self reproduction is therefore not a unique characteristic of the gene (cf. p. 159 above).

1758 Lepeschkin, W. W. & Goldman, D. E.
Effects of ultrasound on cell structure.
J. Cell. Comp. Physiol. 1952 : **40** : 383–97.

Exposure to supersonic waves at frequencies of 400, 700 and 1000 kilocycles causes swelling, displacement, coagulation and dissolution of the nuclei of various organisms, including *Saccharomyces cerevisiae*.

1759 Lindegren, C. C. & Rafalko, M. M.
The structure of the nucleus of *Saccharomyces bayanus*.
Exp. Cell Res. 1950 : **1** : 169–87.

Detailed descriptions of nuclear organization are presented. The centrosome is closely associated with the chromosomes in a manner typical of fungal nuclei. Since the chromosomes and centrosome are not simultaneously Feulgen positive it is proposed that a distinction should be made between chromosomal chromatin and centrosomal chromatin.

1760 Lindegren, C. C. & Lindegren, G.
Asci in *Saccharomyces* with more than four spores.
Genetics 1953 : **38** : 73–78.

Genetical analysis of asci produced by hybrids heterozygous for 4 genetic markers has shown that 8 of every 10 asci with more than 4 spores contain more than the 4 kinds of spores expected as a result of normal meiosis followed by supernumerary mitosis. It is therefore suggested that asci with more than 4 spores arise by fusion of adjacent sporulating cells either before or after meiosis, and that supernumerary mitoses occur rarely if at all.

1761 Fischer, G. W.
Evidence of complex physiological heterothallism in *Ustilago striiformis hordei*.
Res. Stud. St. Coll. Wash. 1953 : **21** : 57–72.

When monosporidial cultures derived from each of 24 isolates obtained from *Agropyron* and *Elymus* spp. in western USA were mated in all possible combinations, two compatibility groups were usually detected among progeny of any one spore; in several cases however only a single compatibility group was represented. Matings between 46 monosporidial cultures showed the existence of at least six compatibility groups, each being compatible with two others. The identity of the groups was maintained in matings with *U. bullata*. It is concluded that although such groupings pertain to sexual reproduction, they should be termed mating types or compatibility groups rather than sexes.

1762 Fries, N. & Aschan, K.
The physiological heterogeneity of the dikaryotic mycelium of *Polyporus abietinus* investigated with the aid of micrurgical technique.
Svensk Bot. Tidskr. 1952 : **46** : 429–45.

Descriptions are given of a microscopic technique devised to isolate monocaryotic cells from

dicaryotic mycelia. The term neohaplont is used for monocaryotic mycelia which are derived from a dicaryon without an intervening nuclear fusion and reduction. Most of the neohaplonts were biochemically distinguishable from the original haplont strains from which the dicaryotic mycelia were derived. It is suggested that variants with biochemical deficiencies may represent spontaneous gene mutations which are masked in the dicaryotic phase by the other partner of the dicaryon.

1763 Aschan, K.
Studies on dediploidisation of the basidiomycete *Collybia velutipes*.
Svensk Bot. Tidskr. 1952 : **46** : 366–92.

A large number of morphological and biochemical mutants with monocaryotic mycelia were obtained from oidia and basidiospores of *C. velutipes* after treatment with nitrogen mustard and ultraviolet light. Pairing between different mutants and between mutants and wild type haplonts gave rise to dicaryons capable of undergoing spontaneous dediploidization, thus giving rise to monocaryotic oidia. Analyses of oidial chains showed that oidia of a given chain are all of the same mating type, but other chains from the same dicaryotic mycelium may represent another compatibility group. Many neohaplonts (cf. Abst. 1762) developing from these oidia differed from their original haplonts. Variation among the neohaplonts was observed even when the nuclei were identical. Such variants may be due to an increased mutation frequency for genes in the foreign cytoplasm encountered during the dicaryotic phase, degenerative changes in the cytoplasm involving certain plasmagenes or a combination of both factors.

1764 Frandsen, N. O.
Zur physiologischen Spezialisierung von *Colletotrichum lindemuthianum* (Sacc. et Magn.) Bri. et Cav. [**On physiological specialization of *C. lindemuthianum* (Sacc. and Magn.) Bri. and Cav.**].
Z. PflKrankh. 1953 : **60** : 114–25.

Nine different physiological races were identified by tests of 12 single-spore lines obtained from collections within a small area in the bean plots at the Plant Breeding Institute, Voldagsen, Germany. Most of these races differed from the previously known European races and three caused infection in the bean Anthracnose Resistant 22 and other varieties bred for resistance; but a small-seeded primitive form of *Phaseolus vulgaris*, No. 375, from Argentina, some *Vigna sinensis* material and two varieties of *Ph. coccineus* proved resistant to all the races.
Genetic aspects of specialization and resistance are briefly referred to.

1765 Kernkamp, M. F. *et al.*
Investigations on physiologic specialization and parasitism of *Rhizoctonia solani*.
Tech. Bull. Univ. Minn.1952 : No. 200 : Pp. 36.

Research carried out during the past 15 years at the University of Minnesota has shown that although races exhibit no specialization for invididual host species, there is some indication that isolates from certain crops are more pathogenic on these crops than other isolates.

1766 Richter, H. & Schneider, R.
Untersuchungen zur morphologischen und biologischen Differenzierung von *Rhizoctonia solani* K. (**Investigations on morphological and biological differentiation of *Rh. solani* K.**).
Phytopath. Z. 1953 : **20** : 167–226.

Observations on 176 strains of *Rh. Solani* from 45 host species belonging to 24 plant families have led the writers to conclude that constant, distinctive morphological, physiological and pathological differences are present in the material examined. The morphological differences could be used to classify the various strains into separate groups, which were found to correspond in general with a classification arrived at on the basis of the ability of the component strains within each group to form anastomoses.
Though the physiological differences did not provide criteria for such groupings they offered evidence of the evolution of specific races within strains and, in the case of strains derived from potato, of biological specialization for a particular host.
Also within the strains derived from potato, indications of quantitative differences in virulence were noted.

1767 Visconti, N. & Delbrück, M.
The mechanism of genetic recombination in phage.
Genetics 1953 : **38** : 5–33.

A theory for the recombination of genetic markers of phages during mixed infection of bacteria is developed. It assumes that phage particles become vegetative on entering the host, and, after multiplying, pair repeatedly at random before they mature. Analyses of phage populations from *Escherichia coli* strain H

infected with two mutants of T2 differing in respect of three genetic factors, either independent or linked in various ways, have been carried out. The results support the theory and indicate that each particle mates five times. Not less than a whole linkage group is involved in the elementary act of recombination, and interference between different recombinations within the same linkage group is incomplete.

1768 Bertani, G. & Weigle, J. J.
Host controlled variation in bacterial viruses.
J. Bact. 1953 : **65** : 113–21.

Phage λ, when passed through *Escherichia coli* strain S, was capable of infecting both strains S and C; on the other hand, after growing in C, λ became modified so that it was unable to grow in S although it could still grow in C. This modified form was designated λ C. A few λ C phages which appeared to grow on S had become readapted, behaving like typical λ bacteriophages.

Similar observations were made on the relationship between phage P2 and two hosts, *Shigella dysenteriae* and *E. coli* strain B; P2 was modified to P2B by the latter host. These changes in the infective properties of viruses occur in one growth cycle and involve neither mutation nor selection. The resemblance between these observations and those concerning the liberation of modified Tλ phages by strains of *E. coli* infected with T2 and T6 is emphasized (cf. Abst. 970).

1769 Köhler, E.
Ein unbekanntes Kartoffelvirus. (**An unknown potato virus**).
Ber. dtsch. bot. Ges. 1953 : **66** : 63–65.

Infection tests with a virus, found in a potato strain from the Rhineland and differing from any viruses found in Germany hitherto, are described. Whether it is identical with the virus recorded by De Bruyn Ouboter and by Rozendaal remains to be discovered.

1770 Rozendaal, A.
Nieuwe virusproblemen bij de aardappel. (**New virus problems in the potato**).
Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1952 : **8** : 94–98.

A detailed account is given of the difficult investigations carried out in Holland in 1950–51, in the attempt to identify a supposed new virus, discovered in plants of Bintje and Industrie [Industry]. It appears to be readily transferred by sap, but not easily, if at all, by aphids.

1771 Maaløe, O. & Symonds, N.
Radioactive sulphur tracer studies on the reproduction of T4 bacteriophage.
J. Bact. 1953 : **65** : 177–82.

After labelling phage with S^{35}, an examination of the products released by lysing host cells has shown that immature phage particles contain sulphur but no nucleic acid. This result is contrasted with the knowledge that the first immature phage structure inside the host contains nucleic acid but no sulphur.

1772 Kleczkowski, J. & Kleczkowski, A.
The behaviour of *Rhizobium* bacteriophages during and after exposure to ultraviolet radiation.
J. Gen. Microbiol. 1953 : **8** : 135–44.

No evidence was found of multiplicity reactivation, i.e. genetic recombination of inactive particles to produce active phage within the host, such as was observed in similarly treated bacteriophages of *Bacterium coli* (cf. *PBA*, Vol. XIX, Abst. 2436). By exposing infected bacteria to visible light, however, the residual activities of irradiated phage particles were increased by amounts equivalent to reducing the doses of ultraviolet radiation by a constant factor (cf. *PBA*, Vol. XXII, Abst. 81). Photoreactivation did not occur when the host and irradiated phage culture were exposed separately to visible light.

1773 Bawden, F. C. & Kleczkowski, A.
The behaviour of some plant viruses after exposure to ultraviolet radiation.
J. Gen. Microbiol. 1953 : 145–56.

The ability of ultraviolet-inactivated virus to interfere with the establishment of active virus in plant tissues was demonstrated, using tobacco mosaic virus (TMV), tomato bushy stunt virus (BSV) and Rothamsted tobacco necrosis virus (RTNV); interference was most marked between inactive and active isolates of the same virus. While the residual activity of irradiated isolates of RTNV and BSV was increased by exposing inoculated plants to visual light (cf. Abst. 1772), irradiated preparations of TMV had the same powers of infection whether plants were kept in the light or in darkness after inoculation.

1774 Doermann, A. H. & Hill, M. B.
Genetic structure of bacteriophage T4 as described by recombination studies of factors influencing plaque morphology.
Genetics 1953 : **38** : 79–90.

Data are presented on a group of mutant factors, designated *tu*, which increase the turbidity of

the plaque halo of phage T4 in *Escherichia coli*. The percentage recombination among the *tu* factors and between these and other loci, *r* and *m*, influencing plaque morphology, shows that the mutants fall into two linkage groups, one of three and the other of five loci. In each linkage group the loci are distributed in a linear sequence. The small positive correlation in the occurrence of neighbouring recombinations disappears if the recombination values per mating are calculated according to principles of population genetics (cf. Abst. 1767).

INSECTICIDES

1775 Heywood, V. H.
***Chrysanthemum praeteritum* Horwood : its provenance, taxonomy and allied species.**
Notes R. Bot. Gdn 53–60.

Specimens of *Tanacetum* (*Pyrethrum*) collected in Anatolia have shown affinities with both *T. densum* and *T. praeteritum* (*Chrysanthemum praeteritum*). The new material, forming a distinct geographical population, has been designated *T. densum* subsp. *amani*.

1776 Toxopeus, H. J.
Studies in the breeding of *Derris elliptica* and *Derris malaccensis*. II. Crossbreeding, cytological observations, genetic system.
Euphytica, Wageningen 1952 : **1** : 175–83.

Difficulties encountered in obtaining seeds from intraspecific and interspecific crosses among wild and cultivated types, as a result of male and female sterility, are described. High content of toxic substances has shown very pronounced recessiveness in crosses with wild material. *D. elliptica* and *D. malaccensis*, whether wild or cultivated, each have chromosome numbers of $2n = 22$ and $2n = 24$. Somatic chromosome numbers of five other species have been determined: *D. elegans*, 22; *D. uliginosa*, 24; *D. heterophylla*, 24; *D. timorensis*, 26; and *Milletia dasyphylla*, 16. Intraspecific and interspecific crosses of *D. elliptica* and *D. malaccensis*, involving one parent with $2n = 22$ and another with $2n = 24$, had $2n = 23$ chromosomes. Long and short chromosomes have been observed in these and other species. Preliminary meiotic studies of *D. elliptica* and *D. malaccensis* have provided evidence of structural hybridity; the frequent occurrence of dwarfs among the seedlings is believed to support this finding. Randomly chosen plants of both species have been found to possess a fairly high degree of heterozygosity, in spite of the fact that their offspring must have originated mostly from selfed seed. Possibly structural hybridity and natural selection against the weaker homozygous plants have contributed to this situation. The rarity of toxic plants in the wild state is ascribed to the dependence of toxicity upon a number of recessive genes, and to the effect of natural selection upon any toxic plants, which must arise mainly by inbreeding.

1777 Delhaye, R. J.
L'étude de la pourriture des inflorescences de pyrèthre à la station de Mulungu. (**The study of bud rot disease of the inflorescences of pyrethrum at the Mulungu Station**).
Bull. Inform. INEAC 1952 : **1** : 305–20.

Efforts are being made to discover strains of pyrethrum resistant to the disease, which is attributed primarily to *Ramularia* infection. The criteria used in selection are listed. One clone shows superior resistance but its defects have still to be remedied by hybridization.

CROP PLANTS

1778 Howard, H. W.
Crops and plant breeding.
J. R. Agric. Soc. 1952 : **113** : 133–44.

Research in progress in connexion with breeding improved varieties of wheat, oats, barley, fodder beets, linseed, sugar beet, cabbage and other forms of *Brassica oleracea*, field beans and peas for the United Kingdom is reviewed. The following major problems are among those briefly outlined: attempts to incorporate resistance to *Puccinia glumarum* in otherwise desirable European wheat introductions (cf. *PBA*, Vol. XXII, Abst. 1812); improving the powdery mildew resistance of oats (cf. *PBA*, Vol. XXII, Abst. 1838); barley hybridization involving new sources of genetic variability (cf. *PBA*, Vol. XXII, Abst. 392); maintenance of breeding strains of cabbage and allied vegetables by vegetative propagation (cf. *PBA*, Vol. XXII, Abst. 2291); and the association of vigour with natural cross fertilization in winter beans (cf. *PBA*, Vol. XXII, Abst. 3064).

1779 Die Halle der Wissenschaft. (**The Hall of Science**).
Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin 1952 : Pp. 127.

For the benefit of visitors to the Agriculture and Horticulture Exhibition in Leipzig-Markkleeberg in 1952, this brochure giving an over-all

account of the German Academy of Agricultural Sciences in Berlin was prepared. The section on plant breeding and cultivation describes experiments on the influence of sprouting and time of sowing in variety tests of potatoes, cereals and other crops; the production of the Bernburger dual-purpose flax by crossing linen flax with linseed and back-crossing with linen flax; the early history of the creation of sugar beet by selection and the modern use of heterosis and polyploidy; the use of Mičurin's methods in crossing cabbage and marrow-stem kale with winter rape; the use of vernalization in speeding up seed production in onions and sugar beet; improved polyploid forms of kohl rabi, radish, cabbage, various forage plants, primula, chamomile and peppermint; studies of the effects of radiation of varied wavelength and of grafting; breeding of ergot races of improved medicinal quality; and intersterility groups in fruit trees.

1780 Vorträge über Pflanzenzüchtung 1951. (**Lectures on plant breeding, 1951**). Land- u. Forstw. ForschRat e. V. Bonn 1951 : Pp. 110.

The following lectures delivered at various gatherings of plant breeders and agricultural scientists in Germany during 1951 are published in this small volume.

Frandsen, K. J. Methodische Fragen der dänischen Futterpflanzenzüchtung. (*Questions of technique in Danish forage plant breeding*). (*pp. 1–14*).

In defence of the Danish method of family breeding it is mentioned that three mangel strains when left for four generations to reproduce without any selection, showed no tendency to deteriorate in yield. The use of the polycross method as developed in Denmark is described; the number of lines that go to make up a strain depends on the plant species concerned, particularly on its tendency to inbreeding depression.

Descriptions are given of the artificial infection methods used in breeding red clover for resistance to *Sclerotinia Trifoliorum* and *Tylenchus dipsaci*. The best lines have been converted into tetraploids, which are still more resistant; they also have a higher dry matter content and give 20% more yield. Tetraploid Merkur from Svalöf has proved more resistant to eelworm than the diploid.

The opinion is expressed that the limits have in no way been reached in raising productivity by the combined effects of plant breeding and intensified agriculture.

Nohe, E. Technisierung und Rationalisierung des Pflanzenzuchtbetriebes. (*Mechanization and rationalization of a plant breeding farm*). (*pp. 15–27*).

Various labour-saving devices, such as sowing whole ears, planting of parents designed for crossing in adjacent rows, use of metre-wide seed drills, cultivating machines of adjustable width, small-scale binders, and small-scale threshers for single plots and for smaller quantities, are recommended, together with the use of some type of motor which will serve for as many as possible of these machines. A plea is made for closer intergration of theory and practice.

Höppner, H. Die richtige Versuchsanlage und -durchführung als Voraussetzung für die Bewertung von Neuzüchtungen. (*Correct lay-out and management of experiments as a prerequisite for judging newly bred strains*). (*pp. 28–35*).

The subjects discussed include coordination between the number of experiments and the amount of trained workers available at the busiest times; limitation of tests to areas where the strain in question is likely to be adapted; preparation of the experimental plots in a manner analogous to that under which the crop is grown on the farm; observation of the usual crop rotation in the same connexion; attention to pollination requirements, particularly in the case of certain special crops such as tetraploid rye; the choice of correct harvesting times according to the requirements of each crop or variety; the correct number of cuts in the case of fodder plants; the use of correct methods in determining dry matter content; and finally, the limitation wherever possible of the number of varieties tested to a number suitable for efficient modern lay-outs.

Hoffman, W. Ergebnisse der Mutationszüchtung. (*Results of breeding by mutation*). (*pp. 36–53*).

Tabular details, illustrations and descriptions are presented concerning the 586 mutations that have been produced in Haisa barley by X ray treatment and of a number of other artificial mutations produced in spring barley, winter wheat, flax and other plants at Halle/S. in Germany. The Haisa mutants contain almost all the characters known in the world barley collection, even some quite rare "endemic" characters. Those of practical value include strong straw, mildew resistance, short awns, awnlessness, high and low protein content, superior baking quality, drought resistance and

earliness. The mutants have a wider range of variation in respect of the main economic characters; 1000 corn weight, for example, varied from 20 to 57 grm., as compared with the parent variety where it ranged from 26 to 49 grm.; protein content varied from 7 to 16% as against 10–11% in Haisa. Transgression was sometimes observed when two mutants of a similar type were intercrossed, as when two early mutants were crossed and gave rise to a spring barley which in spring sowings ripened together with the winter barleys. Yield comparisons have been made with 194 of the mutants, of which 72 have proved equal or superior to the original Haisa; mutant 90 ripens 5 days before Haisa and in the four-year period 1947–50 exceeded it by 8% in average yield, having given a satisfactory performance in a fairly wide range of localities, including those with dry sandy soil.

Rudorf, W. Blütenbiologische Voraussetzungen der Heterosiszüchtung. (*Characteristics of floral biology required for heterosis breeding*). (*pp. 54–67*).

Various modifications of the hybrid maize methods are outlined and discussed. They include a scheme based on inbred-pair lines in diecious plants, the use of pollen sterility of various kinds as applied in the USA and a scheme which uses *S* genes for the same purpose, according to the system $(S_1S_2 \times S_1S_3) \times (S_1S_4 \times S_1S_5)$. It is suggested that methods such as those used for lucerne and other vegetatively reproduced plants should be applied to the potato.

Schnell, W. Probleme der quantitativen Vererbung in der Maisgenetik und Maiszüchtung. (*Problems of quantitative inheritance in maize genetics and maize breeding*). (*pp. 68–85*).

The literature on quantitative inheritance is reviewed with particular reference to maize. Mather's distinction between major genes and polygenes is considered one of convenience rather than of principle; the dominance theory of heterosis is seen to have more supporters than theories of interaction, though these are beginning to find expression in some of the newer methods of maize breeding, which are outlined.

Hertzsch, W. Bedeutung der Polyploidie in der Futterpflanzenzüchtung. (*The importance of polyploidy for breeding forage plants*). (*pp. 86–95*).

Reference is made to the occurrence of natural polyploidy in such species as *Poa pratensis*, *Phleum pratense* and *Dactylis glomerata*. Further chromosome doubling in such species does not generally improve their yielding capacities, since they have apparently reached their chromosomal optimum already; natural diploids like *Poa fertilis*, on the other hand, give marked increases of vigour when doubled.

Scandinavian results with artificial polyploids of clover and lucerne species are mentioned. In experiments with *Ornithopus*, the author has observed wide variations in vigour from one progeny to the other in tetraploids obtained from a single strain, though the majority of them exceeded the diploid in yield of leaf and stem and also in the ratio of leaf to stem. Tetraploids of *Vicia villosa* with broader leaves have been produced but all tetraploids and hexaploids of this species reverted to the diploid condition in later generations.

Rudorf, W. Genetische Grundlagen der Weiterentwicklung der Pflanzenzüchtung. (*The genetical basis of further developments in plant breeding*). (*pp. 96–110*).

In a general examination of the present position it is concluded that no reliable technique is at present available for controlling the direction of artificial mutations, though the number of chlorophyll mutants gives a rough measure of the number of vital, gene mutants; the agriculturally valuable mutants obtained in barley by Gustafsson (cf. *PBA*, Vol. XVIII, Abst. 687) and Hoffmann (see above) and by certain other workers in other crop plants are referred to, though a warning is given that most of them excel the parent only under certain special conditions.

The importance of the genotype of the initial material for the behaviour of polyploids is stressed; few, if any, autopolyploids have equalled the diploids in fertility; even tetraploid rye, it is thought, is preferred because of its grain quality rather than yield; in sugar beet and mangels the triploids seem to give the best results, and the most promising autotetraploid so far produced would seem to be that of Alsike clover, where particularly the late cuts and those in the second year are superior and no reduction of fertility occurs. Among the allopolyploids, *Triticale* has still not been brought up to common wheat in yielding capacity, but the author's synthetic turnip rape is 5–10% higher than Lembke's in yield.

By the use of *Hordeum spontaneum* var. *nigrum*, mildew-resistant winter barleys equal to Peragis 12 in yield and superior to it in standing capacity have been produced, in addition to the mildew-resistant spring barleys already reported (cf.

PBA, Vol. XXII, Abst. 1175). Promising wheat hybrids have now been obtained from *Triticum Timopheevi*, and new blight-resistant interspecific potato hybrids excel the commercial varieties in both yield and quality.
Figures are given which show that the wheat hybrids now available outyield the old standard variety Carsten V by up to 14·5% and the position in barley is much the same; thus material improvements can still be expected from ordinary breeding methods.

1781 Vorträge der Herbsttagung Münster 1952. (**Addresses at the Autumn Meeting at Münster in 1952**).
Arch. dtsch LandwGes. 1952:**10**: Pp. 160.
At the meeting of the Deutsche Landwirtschafts-Gesellschaft in September 1952 the following addresses were delivered in the plant breeding section.

Schlösser, A. Gegenwartsfragen der Zuckerrüben- und Futterrübenzüchtung. (*Present-day problems in breeding sugar beets and mangels*). (*pp. 64–78*).
Figures are given which show that the sugar yield may be reduced by 30% after an attack of *Cercospora beticola* and reference is made to resistant strains bred by crossing Kleinwanzleben ZZ beets with Munerati's resistant *Beta maritima*; the resistant N and E strains are now fully equal to the former susceptible strains in yield and other qualities.
Extensive investigations of cultivated sugar beets have revealed the presence in certain forms of every main group of genes for tolerance of the yellows virus and the mosaic virus. The best families have shown less than 17% reduction in sugar yield in conditions of heavy yellows infection, as compared with 54% for Kleinwanzleben N. At least six different strains of the yellows virus and three of mosaic have been detected.
Tetraploids have been produced from all the best lines of sugar beet and then intercrossed. The products are less prone to bolting, yellows and *Cercospora*, give a 10–30% greater yield of leaves than the E types, and a root yield equal to the E types with a sugar content equal to the Z types and low noxious nitrogen. The highest sugar yields of all have been given by some of the triploid families.
Genetically conditioned monogerm seed is so far suitable only for the poorer beet lands, where mechanically segmented seed is found to be too risky. Male-sterile lines have not yet been found to be sufficiently vigorous to justify their use in raising triploid progeny.
Breeding work with the Red Peragis mangel has reduced the amount of oxalic acid in the leaves and raised the dry matter content of the roots.

Pielen, L. Einfluss von Sortenwahl, Saatgutwechsel und Beizung auf den Getreideertrag. (*Influence of choice of variety, seed renewal and disinfection on cereal yield*). (*pp. 78–88*).
Figures are given which show that an increase of 5–10% over the average yield of cereals can be achieved by choice of the most suitable variety, in addition to improvements resulting from the other measures mentioned.

1782 Bericht über die Arbeitstagung 1952 der "Arbeitsgemeinschaft der Saatzuchtleiter" im Rahmen der "Vereinigung österreichischer Saatgutzüchter" gehalten vom 21. bis 23. Februar 1952 an der Bundesanstalt für alpine Landwirtschaft in Admont. (**Report of the 1952 Meeting of the Association of Chief Seed Breeders within the Society of Austrian Seed Breeders, held on 21-23 February 1952 at the National Institute for Alpine Agriculture at Admont**) : Pp. 227. (Mimeographed).
The following papers of interest to plant breeders were presented.

Buchinger, A. Welche züchterischen Schlussfolgerungen können wir aus der praktischen Bedeutung der US-amerikanischen Hybridmaissorten für die österreichische Landwirtschaft ziehen? (*What conclusions concerning plant breeding can we draw from the practical importance of the US hybrid maize varieties for Austrian agriculture*). (*pp. 8–20*).
Experience with hybrid maize in Austria since the war has shown the superiority of hybrid maize when the right hybrids have been chosen, and the conviction is expressed that when Austria produces her own hybrids the maize yields can, given proper cultural measures, be raised from 25 q. per ha. to twice that. In the meantime hybrids of American pedigree are being produced in Austria.

Zürn, F. Die Bedeutung der Futterpflanzenzüchtung für die österreichische Grünlandwirtschaft. (*The importance of forage plant breeding for Austrian grassland*). (*pp. 21–35*).
Clear differences in leafiness and yield were observed between different varieties, which

differed also in resistance to diseases such as rust and *Helminthosporium*, in earliness, and in tillering capacity. Thus in tests of 22 varieties of timothy, 7 gave yields of over 400 q. of green matter per hectare in 1942 and 5 gave less than 350 q., corresponding to a difference of some 20 q. of hay per ha. The differences were maintained when tests were carried out at altitudes between 1700 and 1900 m. and it is not considered necessary to breed separately for the high altitudes.

Zürn, F. Grünlandwirtschaft und Futterpflanzenzüchtung in verschiedenen europäischen Ländern. (*Grassland agriculture and forage plant breeding in different European countries*). (*pp. 36–47*).

A review of the situation in Sweden, Denmark, England, Holland and Germany is given.

Pfeiffer, R. Die bisherigen praktischen Erfolge der künstlichen Polyploidisierung bei den Getreidearten. (*The practical results to date of artificial induction of polyploidy in cereal species*. (*pp. 51–62*).

An outline is given of the polyploid relationships of the existing cereal species and of Müntzing's report on tetraploid rye (cf. *PBA*, Vol. XXI, Abst. 1804). Tetraploid Petkus rye has given promising results in preliminary tests in Austria. Reference is made to the work of Schwanitz (cf. *PBA*, Vol. XXI, Abst. 830) and the opinion expressed that much remains to be done in this particular field. Successful results with various plants other than cereals were referred to in the discussion.

Hänsel, H. Vernalisation (*Jarovisation, Kältestimmung*). *Forschungsergebnisse und ihre Verwertung in Pflanzenbau, Samenbau und Pflanzenzüchtung.* (*Übersicht*). [*Vernalization. Experimental results and their application in plant cultivation, seed production and plant breeding.* (*A review*)]. (*pp. 66–120*).

An historical review of the literature is presented.

Fuchs, H. Übersicht über die Methoden zur Qualitätsbeurteilung von Weizenzuchtstämmen. (*Review of the methods of determining quality in breeding lines of wheat*). (*pp. 121–30*).

The inadequacy of hectolitre weight as a measure of milling quality is mentioned and the various direct and indirect methods of determining baking quality on small samples are described. In the discussion, H. Hänsel referred to a modification of the Zeleny sedimentation test in which quality can be determined from 0·8 grm. of flour; the results showed that although yield and quality were negatively correlated as between varieties, no such correlation was detectable between different lines of any particular cross.

Pammer, F. Ergebnisse der Getreide-Sortenversuche 1951. (*Results of the cereal variety trials, 1951*). (*pp. 143–45*).

A brief analysis is given of the results of the last four years. The winter barleys Brucker 2 and 3 have beaten all others in yield, but as a quality barley Tschermak's Two-rowed retains pride of place. The two Pannonian ryes Tyrnauer and Marchfelder have outstripped all others in all districts, even the alpine zone. An Austrian mildew-resistant spring barley, Bayerngerste [Bavarian Barley], and Austria Weiss [Austria White] oats have shown promise. Among spring and winter wheats no particular varieties singled themselves out.

Demel, J. Ergebnisse der Kartoffel-Sortenversuche 1951. (*Results of potato variety tests 1951*). (*pp. 147–54*).

In the mid-late group, Agnes receives special mention.

Pammer, F. Anlage und Auswertung von Sortenversuchen. (*Lay-out and calculation of variety trials*). (*pp. 160–72*).

The analysis of variance is explained and illustrated by examples.

Graf, A. Verschiedene Auswertungsmöglichkeiten eines nach der Langparzellenmethode angelegten Versuches. (*Different methods of calculation of results of an experiment laid out by the method of parallel plots*). (*pp. 173–94*).

Where the analysis of variance cannot be applied, the method of Dorph-Petersen is recommended rather than that of Zade for the calculation of the results.

Jähnl, G. Einige mit Hilfe der Varianzanalyse auswertbare Versuchsanordnungen. (*Some experimental lay-outs to which the analysis of variance can be applied*). (*pp. 195–206*).

Various lay-outs are described.

Zeller, A. Grenzen der modernen Versuchstechnik. (*Limits of modern experimental technique*). (*pp. 207–15*).

Tables are given showing the number of replications required to attain a given degree

of significance in randomized block experiments.

1783 Jarmizin, D. V.
(Breeding research at the Kirgizian State Breeding Station).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 33–40. [Russian].

Wheat. Several new winter wheats, some of which are still under trial, have been developed. The latter include a hybrid population which develops branching ears with large grains. Erythrospermum 72 was obtained by open pollination between Erythrospermum 501 and Ukrainka 246. It has better baking and milling properties and yields 8 c. more per ha. than the standard. Erythrospermum 9, another new hybrid, shows resistance to yellow rust. Erythrospermum 132, Nigriaristatum 5, R–1, Erythrospermum 60 and Erythrospermum 61 were obtained by multiple hybridization and are adapted to rain-fed cultivation. Erythrospermum 60 and Erythrospermum 61 yield 40 c. per ha. and R–1 is 8–10 days earlier than the standard. Some promising natural hybrids of wheat have been selected. Training productive winter wheats for the spring habit is in progress. Some new spring forms have been derived from R–1.

Barley. In Kirgizia, barleys sometimes develop gaping florets with stigmas exposed to foreign pollen. Some natural hybrids are being tested. The short-strawed standard Nutans 187 gave an F_1 with 15 cm. taller straw and 1·5 cm. longer ear after free pollination with several tall productive barleys. Training winter barleys for the spring habit has intensified the development of new forms of multirowed, two-rowed and intermediate types.

Forage plants. Several productive wild legumes and grasses, including clovers, lucernes, sainfoins, *Arrhenatherum* and *Agropyron*, have been found in Kirgizia. Some of them have passed the trial stage.

Oil plants. Several natural hybrids of the linseed variety Voronež 1308 show promise. Hybrid 541, probably from a cross with Safedak, yields 1·4 c. more seed per ha. than Voronež 1308, and its seed is larger and has a higher oil content. A new variety of *Camelina* is under trial.

1784 Krylov, A.
(New productive varieties for collective farming).
Kolhoznoe Proizvodstvo (Collective farming) 1953 : No. 1 : 22–24. [Russian].

Wheat. New productive winter wheats, developed in the USSR in recent years, include the wheat-*Agropyron* hybrids 599, 1 and 186, adapted to the climatic and soil conditions of the Baltic Republics; Ljgov 873, carrying resistance to lodging; Lutescens 230, with better quality grain than Hostianum 237; and Erythrospermum 118, adapted to cultivation under irrigation. Of the spring wheats, Pamjatj Urala [Ural Memorial] is interesting because of its resistance to loose smut and Narym 1 because of its earliness. Both wheats carry resistance to lodging.

Oat. The productive variety Soviet, which has good quality grain and shows resistance to diseases, has been made a standard in many provinces. A new variety, Orel, proved productive in the Nonblack-earth Belt.

Rye. Volžanka [Volga] is hardy and shows resistance to drought under the conditions of the southeastern RSFSR. Harjkov 194 has given a good account of itself in the Brjansk, Orel and Volynj provinces, and Partizanskaja [Partisan], a productive, hardy, large-grained rye showing resistance to lodging, in White Russia.

Maize. Productive early double crosses, VIR* 42, VIR 37 and VIR 25, which carry resistance to smut and lodging, have been produced at the Institute of Plant Industry. VIR 42 yields 6–11 c. more per ha. than Minnesota 13 Extra, and VIR 37 11–13 c. more than Osetinskaja Belaja Zubovidnaja [Osetian White Dent].

Sunflower. VNIIMK† 1646 and VNIIMK 6540, which have a 3·5–6·5% higher oil content than other varieties, have been made standards in the northern Caucasus and the Ukraine. Šortanda 41, which is 6–10 days earlier than other varieties, shows promise in the colder districts.

1785 Čanov, T. & Kodanev, I.
(The Gorjkiĭ State Agricultural Research Station).
Kolhoznoe Proizvodstvo (Collective farming) 1953 : No. 1 : 57–59. [Russian].

Wheat. Hordeiforme 496, selected from local hard wheats, was made a standard in 1948. It

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† Vsesojuznyĭ Naučno-Issledovateljskiĭ Institut Masličnyh Kuljtur [USSR Scientific Research Institute of Oil Plants].

is more productive than the soft wheat standard and yields, in seasons with ample rainfall, 33–37 c. per ha. when grown upon sward. It is hoped to improve the variety by vegetative hybridization involving spelt and by intervarietal hybridization. Lutescens 2351 has also been selected from local material. It was made a standard in 1949. It shows resistance to lodging and appears to be immune from loose smut. Its baking properties are superior to those of Lutescens 62. Work to improve its productiveness and resistance to drought is in progress. Gorjkiĭ 3653 is a promising new winter wheat, which yields 3·1 c. more grain per ha. than Uljjanovka.

Millet. Gorjkiĭ 43 is a productive variety and has a short growth period. It yields 6·2 c. more per ha. than the standard Omsk 9. It has a low chaff content.

Red clover. A late variety, Krasnyĭ Orel Ulučšennyĭ [Improved Red Eagle], was bred from a local variety. It yields 89·5 c. green matter and 4·4 c. seed per ha. and shows a high degree of resistance to anthracnose and *Sclerotinia.*

Pea. Gorjkiĭ 186 is a new variety obtained by single plant selection and directed training of varieties cultivated in the Mariĭskaja ASSR. It yields 3·4 c. more seed per ha. than the standard Torsdag [Thursday] and carries resistance to drought and *Ascochyta.* Its cooking properties are good.

1786 Pajbjergfondens forsøgs- og forædlingsarbejde 1951. (**Experiments and breeding operations of the Pajbjerg Foundation, 1951**) : 1–25.

Wheat. Breeding material of spring wheat includes seven Pajbjerg strains (cf. *PBA,* Vol. XXII, Abst. 1707) and Pajbjerg Red, all undergoing comparative trials, and some new hybrid populations as well as lines from X-irradiated seed sown in 1951.

Oats. Trials with Staal [Steel], Minor, Rex, Regent and Regal were continued and tests of new hybrid breeding material were also carried out.
The effect of nitrogen manuring on the yield, grain size and crude protein content of varieties is being studied.

Rye. Plants of diploid and tetraploid ryes were selected for polycross experiments.

Barley. In the main trials comprising 121 lines and in tests of 168 new lines, different applications of potassium nitrate were used to ascertain the varietal tendency to lodging and the response to different fertility levels. Other experimental material comprised numerous lines from crosses and X-irradiated plants.
In trials from 1948 to 1951, the new line Nr 81/10 (Maja x Kenia) yielded an average of 44·4 hkg. of grain per ha. as compared with 42·3 and 41·0 hkg. per ha. for Drot/Maja and Freja respectively.
Varietal differences noted in resistance to *Heterodera schachtii* offer some evidence that they may be due to Mendelian segregation.

Herbage plants. Preliminary work has consisted largely in testing plant material collected in Denmark and from other countries and in selecting types for crossing. Breeding of white clover, red clover, lucerne and meadow grasses is in progress.

Ryegrass. On two occasions frost destroyed much material in two breeding experiments, but 7 selections saved from one and 11 from the other will provide new élites which will presumably be more winter hardy than the older type.
Though late types of ryegrass were not quite so sensitive to cold as the early ones, damage to the clones was so severe that the breeding material had to be maintained by seed, which was used for a new experiment laid out in 1949 and harvested in 1950 and 1951. Results suggest that the families differ from other Danish strains in being later and more like the English or Dutch grazing types.
Out of 98 families of the late type, consisting of new experimental material of the strains Øtofte, Hunsballe and Antvorskov, 11 have been chosen for hybridization with 13 families of the original breeding material.
In strain trials, though material from England, Scotland, Holland, Czechoslovakia and America was competing with some local Danish strains, only a couple of British strains bred at Aberystwyth, a Czech commercial seed sample and a Dutch type for grazing were retained for further study. The early Aberystwyth S 24 equalled Early Pajbjerg I in yield, but the late Aberystwyth S 23 proved too late and slow growing for Danish conditions. The same may be said of the Dutch grazing strain, which, however, seems to do quite well in the second year.
In a 1-year trial of Early Pajbjerg I, Aberystwyth S 24 and a very early and very winter-hardy Czech strain, S 24 again did particularly well in competition with the Danish variety.

Lucerne. Selection for yield has been in progress since 1944 and 23 of the best families, including 7 élites, were multiplied for further testing.

Lupin. Final testing of the varieties released to the market was carried out: Sødlupin [Sweet lupin]; Weiko; two lines, 481 and 515, of Pajbjerg Rex; three lines of Pajbjerg Nobilupin [Nobi lupin]; and five new lines of white-seeded lupin in which the tip of the keel is coloured.
Many types of *Lupinus albus* from southern Europe and Palestine are under observation in the search for early, short-stemmed types.
New lines of yellow lupin undergoing multiplication include many with indehiscent pods. The yields of seed and of green forage from the above mentioned 12 varieties of yellow lupin are tabulated.

Beet. Tables are given showing the performance of the breeding material which includes mangels, sugar beets for fodder, sugar mangels with a high dry matter content and others with a moderately high content. A large-topped form of the sugar mangel Pajbjerg Rex X yielded 4% less dry matter in the root than the normal Rex X type, but its yield of tops was 15% higher, i.e. on a 3-year average 50 hkg. per ha. more. If the dry matter content of the tops be taken as 11–12%, the total yield of dry matter of the large-topped form is seen to be considerable.

1787 Rapport d'activité 1932–1950. (**Report of work 1932-50**).
Landw. Jb. Schweiz 1952 : **66** : 17–95.

The following two reports are included in the above publication from the Federal Station for Experiments and Seed Control, Mont-Calme, Lausanne:—

Zweifel, J. Section de la sélection des céréales. (*Cereal Breeding Division*). (*pp. 64–78*).

A review is given of cereal selection and breeding during 1932–50. The merits of spring and autumn varieties and selections of wheat, rye, barley and oats that have undergone trials for yield of grain and straw, quality and resistance to lodging, diseases and pests are mentioned, with tables showing their performance in various years. The new autumn wheat, Probus, has already been recorded from another source (cf. *PBA*, Vol. XXI, Abst. 1732). More recently trials of Swiss and foreign varieties of barley and oats for fodder have been run at Beau-Cèdre; and some line selections from crosses of old Swiss oats carried out at Mont-Calme have also been isolated.

Caputa, J. Section des plantes fourragères. (*Forage Plant Section*). (*pp. 79–86*).

As this section of the Mont-Calme Station was formed only in 1948, the present report is confined to a brief mention of the breeding programme envisaged for forage plants, including the native red clover, other legumes and some forage grasses. Provenance studies of *Trifolium pratense* and *Medicago sativa* are also receiving attention.

1788 Salzmann, R.
Bericht über die Tätigkeit der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon pro 1950/51. (**Report for 1950-51 on the work of the Federal Agricultural Research Institute, Zürich-Oerlikon**).
Landw. Jb. Schweiz 1953 : **67** : 1–73.

In continuation of earlier work (cf. *PBA*, Vol. XXII, Abst. 1033), it is reported that closer cooperation has been established between the Mont-Calme and Oerlikon stations in testing breeding material in the early stages in all parts of the country.
Greater attention is being given to breeding for resistance to brown rust and other cereal diseases, including leaf scorch (Blattdürre), the various organisms responsible for which are being investigated.
Varietal trials were continued with oats, lucerne, potatoes, rape and other plants, in addition to the following activities.
Wheat. Quality and standing capacity proved better in the cross Vilmorin 27 x Probus than in Vilmorin 27 x MC245. Eight promising selections of Vilmorin x Tassilo were made. Five selections of the spring wheat cross Huron x Newthatch combine high baking quality with resistance to mildew and brown rust. Lichti's Weihenstephaner, though still outyielding Huron, proved susceptible to black rust. The spelt variety 24.128 has been released.
Rye. Crosses of Petkus x Rothenbrunn winter rye proved more susceptible to black rust than Rothenbrunn rye. Fellers x Petkus crosses retained the winter hardiness of the Fellers rye and some lines had high 1000 corn weights. Tetra rye gave no increase of yield over the diploid.
Karlshuld summer rye proved superior to Berna and Petkus in yield.
Maize. The best American hybrids exceeded Nostrano dell'Isola by 25–40% in the Tessin and 15% in the Rhine valley.
Barley. Crosses have been made for improvement of winter barley for feeding, and for the

production of mildew-resistant spring and winter barleys. The results of tests of malting barleys in connexion with the European Brewery Convention showed Herta to be the most promising.

1789 Institut za Zaštitu Bilja—Beograd. Izveštaj o radu za 1945–1951. (**Report of the Belgrade Institute of Plant Protection. Research during the period 1945-1951**).
Zaštita Bilja (Plant Protection), Beograd 1952 : No. 13–14 : 9–43.

The wheat variety Konkurs 25 [Competition 25] and hybrids 885/46 from Križevačka x 9 x Barleto, and 822 from Stara Banatska [Old Banat] x Ibrido [Hybrid] x Junalletalik showed a high degree of resistance to *P. triticina* and Konkurs 30 was the least susceptible to *P. graminis* var. *Tritici*.

1790 Zavod za Zaštitu Bilja—Kragujevac. Izveštaj o radu za 1945–1951. (**Report of the Kragujevac Institute of Plant Protection. Research during the period 1945-1951**).
Zaštita Bilja (Plant Protection), Beograd 1952 : No. 13–14 : 47–55.

Wheat. Some varieties, bred at the institute, were tested for resistance to bunt. Caesium and Iz 59 showed the highest degree of resistance in the material tested.
Potato. Wohltmann, Švabovac Domaći [Domestic Švabovac], Iz V and Iz 1/9, the last two varieties originating from Kragujevac, showed combined leaf and tuber resistance to *Phytophthora*.
Bean. Of many Jugoslav and introduced varieties tested for resistance to *Bacterium phaseoli*, only few combined leaf and pod resistance to the disease.

1791 Pokrajinski Zavod za Poljoprivredna Istraživanja Novi Sad, Otsek za Zaštitu Bilja. Izveštaj o radu za 1945–1951. (**Report of the Novi Sad Institute of Agricultural Research, Plant Protection Division. Research during the period 1945-1951**).
Zaštita Bilja (Plant Protection), Beograd 1952 : No. 13–14 : 60–78.

Various economic plants tested for resistance to diseases included the wheats Novosadska 5038 [Novi Sad 5038], Novosadska 1446 and Bánkút 1205, which showed a high degree of resistance to bunt. Reference is made to some wheat varieties, bred at the institute, which did well in trials for resistance to black rust.

1792 Zavod za Zaštitu Bilja—Zagreb. Izvještaj o radu za 1945–1951. (**Report of the Zagreb Institute of Plant Protection. Research during the period 1945-1951**).
Zaštita Bilja (Plant Protection), Beograd 1952 : No. 13–14, 86–118.

Wheat. F_1 hybrids showing resistance to *Puccinia graminis* and *P. triticina* were obtained by crossing some Jugoslav wheats with introduced material carrying resistance. The F_2 has been back-crossed to the susceptible local varieties and the resultant material is being tested for resistance.
Maize. Osmak proved less susceptible to *Sorosporium* than Zuban [Dent] and Hrvatica [Croat].
Potato. *Solanum ochroleucum* and *S. Douglasii* carried resistance to purple top virus.
Bean. Some heterozygous material showing resistance to *Uromyces Fabae* has been selected from a local population. It is hoped to obtain resistant types in a genetically pure state.

1793 **Scientific Reports of the Indian Agricultural Research Institute for the year ended 30th June, 1950** (1952) : Pp. 101.

Induced autopolyploids. Selection of colchicine-induced autopolyploids of self-fertilized crops such as gram, sesame and chilli has not led to improved seed fertility. With toria, a cross-fertilized plant, considerable increases in the seed fertility of tetraploids have however resulted from selection. In a small scale trial, a tetraploid population of toria outyielded the diploid strain by 10%. The possibility of improving seed fertility in polyploids of different crops by intercrossing is being explored.
Wheat. Progress is reported in developing rust resistant wheats. Pot and field experiments showed that under drought conditions 1000 grain weight and spikelet number per ear were the chief factors upon which total yield depended; varietal differences in the two yield components were maintained under different conditions. Combining high values of these two characters in varieties possessing high ear number therefore appears worthwhile. Physiological aspects of yield and the influence of light and temperature on growth and development were studied in different varieties.
Meiotic irregularities, chiefly univalents, were observed in three intervarietal *Triticum vulgare* hybrids. Chromosome pairing in the F_1 of *T. Timopheevi* x *T. turgidum* was incomplete and variable.

Maize. Indigenous and foreign open-pollinated varieties and introduced hybrids were tested. Inbred lines are being studied for their desirability in breeding; selfing and sibbing are being compared as methods of developing inbreds.

Sugar cane. Large scale crosses involving Co. varieties known to be good parents were effected. No viable seeds have so far been obtained from sugar cane x sweet sorghum crosses. Sugar x bamboo seedlings are being studied. Crosses were made to determine the breeding value of *Saccharum spontaneum* forms. Collection of *S. spontaneum* and genera allied to *Saccharum* continued, with exploration of Orissa, West Bengal and North Bihar.

Using the soft-rinded varieties Co. 603, Co. 743, Pundia and Fiji B as parents, further hybridization was carried out to evolve chewing types. The occurrence or absence of starch in the fully formed internode is a specific character (cf. *PBA*, Vol. XXII, Abst. 1708); it is discussed in connexion with the possible origin of *S. Barberi* and *S. officinarum*.

The size of bulliform cells is much greater in late than in early varieties; this difference is regarded as a valuable means of distinguishing early and late canes, even at young stages.

Cytogenetical studies on the origin of *Saccharum* spp. continued (cf. Abst. 1342).

The parentages and general characteristics of 90 new Co. canes are listed.

Tobacco. Promising selections of *Nicotiana rustica* with high nicotine content are under trial.

Sesamum. *S. orientale* x *S. prostratum* amphidiploids were back-crossed to additional types of cultivated sesame to increase the scope of selection (cf. *PBA*, Vol. XXII, Abst. 1708).

Linseed. Rust resistant strains with higher seed yields and better oil content than NP types have been developed. Rust resistance is a monogenic character, dominant over susceptibility, and inherited independently of petal and anther colour.

Onion. Indigenous and foreign varieties were studied for their usefulness in a scheme for the production of F_1 hybrids.

Tomato. *Lycopersicon esculentum* x *L. pimpinellifolium* hybrids, selected for early maturity and high contents of vitamin C and sugar, are under extensive trial. The breeding value of other wild species, e.g. *L. peruvianum, L. hirsutum, L. glandulosum* and *L. Pisissi*, is being explored.

Cajanus Cajan. The high degree of wilt resistance of NP 41 and nine new hybrid strains was confirmed in artificial inoculation tests.

1794 **Annual Report of the Department of Agriculture, Assam 1950-51** (1952) : Pt. I : Pp. 126.

Rice. Trials of hybrid and pure line selections of various types were carried out. In a test of varietal reaction to bunt, Latisail and Swarnasail were the least affected.

Cotton. A scheme for the production of high yielding cottons with short staple and high ginning percentage for the Garo Hills region was initiated.

Other Crops. Oil species, chillies, *Phaseolus Mungo, Ph. radiatus* and several other crops were selected.

1795 Jones, D. K.
Annual Report of the Agricultural Research Officer of the Department of Agriculture, Cyprus for 1951 : Pp. 14. (Mimeographed).

Cereals. Local wheats and the Australian variety Gabo were crossed; the latter is valuable for its earliness and resistance to drought and stem rust. Crosses were also effected among local barleys.

Artemisia. *A. kurramensis* shows promise for the production of santonin.

Onion. Hybrids between a local selection and Australian Brown are under observation.

1796 Valdeyron, G.
Rapport sur les travaux de recherche effectués en 1951. (**Report on the research work carried out in 1951**). Ann. Serv. Bot. Tunis. 1950 : **23** : Suppl. : 1–28.

The plant breeding programme carried out by the Botanic and Agricultural Service of Tunisia (cf. *PBA*, Vol. XXI, Abst. 2450) is summarized below:—

Cereals. In breeding hard wheats, back crosses to the Tunisian parents have been carried out with second generation hybrids from crosses made in 1949 between the American variety Carleton and the Tunisian wheats Kasserine, Mahmoudi and Sindyouk x Mahmoudi, the object being to combine the high quality of Carleton with the characteristics of the native wheats. Back-crossing will also be applied to some new high yielding wheats, e.g. D 115 and the American wheat LD 308. Breeding material is being tested for resistance to rust and lodging and for quality.

The lines of hard wheat retained for purification, multiplication and final testing include: Hedba x Kahla 967, which resists lodging, is of good

quality and gives a promising yield; a highly productive line of D 115 [(Derbessi x Biskri) x M'Rari]; and D 111 (Psathos x Biskri) which combines high yield and quality.
A population of Australian barley is being purified to meet the requirements for a malting barley, until pure varieties can be bred.
Selection of oats is also in progress.

Maize. Trials of hybrid maize have shown that only late varieties such as U 68, 75 and 80 should be retained for irrigated cultivation.

Fruits. The collection of local and foreign varieties of fruit trees has been completed, apricots and almond trees from Italy, Greece, Algeria and France being included. Trials of material previously introduced are in progress.
An almond stock resistant to eelworm is being sought.
Nearly 3000 pollinations of the Caninos apricot by the variety Amor Leuch produced 425 hybrids. Hybrid seedlings from 1949 crosses are being grafted.

Vine. Adaptation to Tunisian conditions is being studied and promising varieties and hybrids are listed.
Experiments to obtain a seedless dessert variety with the muscat flavour are being continued and hybrid seedlings are being raised. The Muscat de Hambourg, Sultanine and Kichmich Ali will be crossed in 1951.

Market garden crops. Over 200 species and varieties of vegetables, medicinal plants, herbs and cucurbits were introduced during the year. Though selections of American water melons have proved superior in dry matter content to the local varieties, selection of native varieties of melons may prove profitable owing to their marked productivity.
About 40 lines of peas have been tested and some promising foreign varieties will be retained.

1797 **Annual Report of the Department of Agriculture, Pretoria, for the year ended 31 August 1952.**
Fmg in S. Afr. 1952 : **27** : 521–636.

Wheat. *Agropyron* derivatives were again found to be promising as regards transmissible resistance to rust at the Stellenbosch-Elsenburg College of Agriculture. Wheat-rye selections were susceptible to *Ophiobolus graminis*.

Maize. Schemes of hybrid breeding continued at several stations and institutes. The top cross Synthetic Potchefstroom Pearl x inbred K 64 has been distributed by the Potchefstroom College of Agriculture, Transvaal; inbreds suitable for the production of double-cross hybrids are now also available and large scale propagation of seed is in progress. Breeding for streak resistance by the Division of Botany and Plant Pathology continued. Seed of two varietal crosses with improved resistance and high yielding ability is to be released for further trial.
In testing inbreds for resistance to *Fusarium moniliforme* var. *subglutinans*, spore injection has proved more reliable than the toothpick method. At the Pretoria Agricultural Research Institute, inbreds of South African varieties are being studied; the heritability of protandry and the relationships between the germinability and performance of inbreds are also under investigation. Progress has been made in developing lines resistant to *Helminthosporium turcicum* and drought at the Natal Agricultural Research Institute, Pietermaritzburg. In addition to the usual methods of breeding, recurrent reciprocal selection is being applied at this institute.

Pennisetum typhoides. Breeding has been initiated at the Pretoria Agricultural Research Institute.

Sorghum. Early maturing, witchweed resistant types suitable for combine harvesting are being bred at the Potchefstroom College.

Pasture grasses. Selection of *Setaria sphacelata* and *Digitaria Smutsii* continued.

Lucerne. At the Grootfontein College of Agriculture, Cape Province, polycross tests are being carried out. Self and cross fertility relationships of a large number of single plant selections are being determined at the Stellenbosch-Elsenburg College; leaf area has proved to be a useful character in selecting for drought resistance.

Lupin. A sweet, soft-coated, nonshattering blue strain is being propagated for release.

Potato. Breeding for resistance to early and late blight and to viruses continued.

Fibre crops. In cotton breeding at Barberton, most attention was given to Muka progenies (MU 8 x BP 52); these are valuable on account of their earlier maturity and improved plant habit and quality, compared with A 2106. The main objectives of breeding now are early maturing cottons for short-season regions, and improved resistance to insects. New crosses were effected, some of the parents being early maturing American varieties. In further selection of *Hibiscus* spp., emphasis was laid upon height, nonbranching habit, fewer seed capsules per plant and rust resistance.

Tobacco. Strains highly resistant to mosaic have been developed, but further improvements in quality and yield are necessary. *Nicotiana glauca, N. dirugla* and *N. digluta* have exhibited

outstandingly good resistance to mildew. Only 0·5% cross-fertilization occurred between tobacco plants in adjacent rows.

Fruits. The new white-fleshed dessert peaches Culemborg and Van Riebeeck were distributed by the Western Province Fruit Research Station, Stellenbosch; they ripen early and late in December, respectively, and have good keeping quality. Hybrids of apple, peach, guava, strawberry, apricot and plum are under test. A polyploid type of guava bore a few fruits, which had poor quality and low seed content. Citrus breeding is in progress at the Nelspruit Station.

Water melon. Seedless types with high quality are to be developed.

Tomato. An attempt is being made to develop varieties resistant to bacterial wilt and eelworm. Hybrid vigour is receiving attention; improved yields are being procured in generations subsequent to the F_1.

Cowpea. Wild and other types have been examined cytologically. Hybrids have been identified among most of the wild forms and are to be further studied.

1798 **Matopos Research Station. Extracts from Annual Report for the period 1st October, 1950, to 30th September, 1951.**
Rhod. Agric. J. 1952 : **49** : 318–42.

Cereals. Wheat lines were tested.
Inbreeding of yellow maize lines continued.
Numerous lines of sorghum are being inbred, prior to hybridization.
Millet selections were made for grain and silage purposes.

Potato. Inbred lines were bulked; several showed promising yield and hardiness.

1799 Activités de la Station Agricole du Lac Alaotra (Madagascar), année 1949–1950. [**Work of the Agricultural Station of Lake Alaotra (Madagascar), 1949-50**].
Agron. Trop., Nogent 1952 : **7** : 153–63.

Sorghum. The performance of 14 lines and varieties of the station collection, when tested on different types of soil, is tabulated to show the dates of germination, flowering, maturity and yield.

Rice. Breeding for increased yield has been begun.
Line selections are undergoing comparative tests and a series of variety trials has been carried out.

Cassava. In 1949–50, hybridizations were carried out, the main aims being mosaic resistance, high yield in the field and a high density and relatively large size of starch grains.
The 1947 hybrids, propagated in 1948, have been undergoing severe selection, 20 out of 42 hybrid clones being retained as promising.
Varietal differences and other features relating to germination capacity are also being studied.

1800 **Annual Report of the Department of Agriculture, Colony of Mauritius 1951**
(1952) : Pp. 89.

Fibre plants. Varietal trials of *Hibiscus cannabinus* and *Furcraea gigantea* are in progress.

Sugar cane. The hybridization programme was facilitated by profuse arrowing both at Réduit and Pamplemousses. Many crosses were made to obtain early maturing canes suited to the cool zone where rainfall is high. An early maturing selection, M 11/43, showed considerable promise in trials with M 134/32; M 31/45 was particularly tolerant of high rainfall. Ebene 1/37, which has already been used extensively for breeding (cf. *PBA*, Vol. XXII, Abst. 2864), has been released by the Highlands Sugar Estate; it is recommended for the wettest areas.

Tobacco. Newly imported Amarello strains from India and South Africa were completely susceptible to black shank. Some Amarello x Bonanza hybrids, however, showed a high degree of resistance and yielded fairly well, resembling Amarello strains in most respects. Under the prevailing epidemic conditions all Virginian flue-cured progenies were destroyed by black shank, but a hybrid between Bonanza and Rg., a cigar wrapper variety from Florida, proved resistant. The leaf quality of this hybrid is being improved by back-crossing to Bonanza.

1801 **The National Research Council Review 1952.** Ottawa : Pp. 271.

Newcombe, H. B. & James, A. P. Atomic Energy Project, Chalk River, Ont. Biology and Radiation Hazards Control Subdivision. Genetics Section (*p. 161*).

Spores of Actinomycetes have shown an unusual effect of radiation. With high doses of γ rays (150,000 r.), more than half of the spores give rise to genetically unstable lines, producing mutants with changes in nutritional requirements or colour, or in both characters. The lines differ in degree of instability and in the proportions of the mutant types formed. They can be perpetuated indefinitely without loss of instability, but sometimes yield stable and apparently normal sublines; other sublines may be more or less unstable compared with the main line of descent, or may yield the mutant types in altered proportions.
Ultraviolet-induced mutation in the ability of

yeast to ferment galactose has occurred with a greater frequency than would be expected if it resulted from genic alteration. The sensitivity to induced change is however apparently under genic control, since the descendants from crosses between separate strains differ in the likelihood of the induction of this type of change by a given dose of ultraviolet light.

Associate Committee on Plant Breeding of the National Research Council and the Dominion Department of Agriculture. (*pp. 205–07*).

University of Alberta

Wheat. A long-term back-crossing programme in connexion with the cytogenetical analysis of *Triticum* by means of nullisomics and monosomics, and investigations on the physiological and cytological effects of 2,4-D continued (cf. *PBA*, Vol. XXII, Abst. 1711).

Barley. Genetical studies are being carried out on earliness. Further work confirmed the importance of the genetic constitution of the embryo in resistance to loose smut (cf. *PBA*, Vol. XXII, Abst. 1711).

University of Manitoba

Barley. More than one gene pair was found to be involved in the inheritance of resistance to race 4 of barley leaf rust.

University of Saskatchewan

Wheat and barley. The effectiveness of P^{32} for the induction of mutations in wheat and barley is under investigation. An aneuploid series of *Triticum durum* is being developed. Rye chromosomes are being substituted for wheat chromosomes in the winter variety Kharkov. The possibility of inducing beneficial mutants in barley by various types of irradiation is being explored. Use of P^{32} has given the highest proportion of mutations without detrimental effects upon chlorophyll production; the value of the mutants, particularly as regards straw strength and early maturity, has still to be determined.

1802 **Report of the Federal Experiment Station in Puerto Rico, 1952** : Pp. 24.

Derris elliptica. Out of 372 intervarietal crosses only 4 pods set. The cause of low fertility is not yet understood.

Panicum maximum. Cytological investigations of several varieties indicated that probably this species reproduces chiefly by apomixis.

Pueraria phaseoloides. A true-breeding "hairless" mutant, with appressed hairs, probably differs from the normal type by a single gene pair.

Sweet potato. Hybrids have been obtained between Jersey varieties and moist-flesh types.

Vanilla. Crosses involving *V. Pompana, V. phaeantha* and *V. planifolia* were made, using pollen stored 2 to 3 weeks.

Hevea brasiliensis. Midges are the chief pollinating agents (cf. *PBA*, Vol. XXII, Abst. 648).

Papaya. Inheritance of sex type and other characters is being studied in the cross *Carica Goudotiana* x *C. monoica.*

1803 **Toward the future with your college of agriculture. Combined Report of the University of Vermont and State Agricultural College, July 1950–June 1952** : No. 5 : Pp. 31.

Forage legumes. Regional trials are to be carried out on a new Ladino clover strain, which cannot be crossed with wild white clover or other Ladino strains by bees. An improved hay type of birdsfoot trefoil has been developed.

Sugar maple. Trees with a high content of sugar have been selected for the provision of improved cuttings; the trees maintain their good yields irrespective of seasonal variations.

Strawberry. Disease resistant, high yielding varieties are being bred.

1804 **Agricultural Progress Through Research. 63rd Annual Report of the Maryland Agricultural Experiment Station, July 1, 1949 - June 30, 1950.**

Sta. Bull. 1950 : No. A–62 : Pp. 44.

Wheat. The promising leaf-rust resistant selection USDA 2381 (Leapland x Fronteira) is to be increased for commercial distribution.

Strawberry. A second strain of the red core fungus has been discovered; Temple is susceptible to the new strain (cf. Abst. 1805).

Cantaloupe. Crosses were made to develop selections with good appearance, high quality and resistance to defoliation.

Sweet corn. Several new inbreds, notably Md. 553.1, are ready for commercial use.

1805 **Research leads the way to agricultural progress. 64th Annual Report of the Maryland Agricultural Experiment Station.**

Sta. Bull. 1951 : No. A–67 : Pp. 88.

Role of boron in crossing. The role of boron in the physiology of flowering and fruiting is being investigated in lily species. Cases of failure of interspecific crosses in general are possibly related to the boron content; it may therefore prove feasible to control the boron

content in such a way that crosses hitherto considered impossible may be successful.

Maize. The new Maryland hybrid 990 shows promise.

Forage crops. Selection of cocksfoot is in progress.

Red clover selection has been initiated to develop strains with even higher yielding ability than the southern-anthracnose resistant variety Kenland (cf. *PBA*, Vol. XXI, Abst. 2741) and with resistance to other diseases.

Tobacco. Crosses between Maryland Broadleaf and disease resistant wild strains and species have yielded selections resistant to mosaic, black root rot, wildfire or blackshank; in some cases resistance to the first three diseases has been combined in a single plant. Mosaic resistant lines are now being selected for the Maryland Broadleaf type. Hybrids between Maryland Broadleaf and the blackshank resistant Florida 301 are under test for resistance to this disease. The development of strains resistant to anthracnose is also receiving attention.

Capsicum. Chemically induced doubling of the chromosome number of haploids derived from twin seedlings has resulted in peppers with promising commercial characters.

Raspberry. The early ripening red raspberry Antietam is to be released; it has withstood nine consecutive winters without injury. In recent crosses, European varieties and Asiatic species have been used in the hope of obtaining improved fruit size and quality combined with better resistance to diseases and drought. Black raspberry breeding is also being carried out.

Strawberry. Selections resistant to both strains of red core are under test (cf. Abst. 1804).

Asparagus. Colchicine-treated plants of Mary Washington with double the usual chromosome number are being compared with standard varieties.

Cantaloupe. Promising lines combining high sugar content and resistance to defoliation by diseases are under test.

Tomato. Variation in the chromosome number of root tip cells of Pan America was determined; some cells with 25 or 26 chromosomes were observed in addition to those with the typical number ($2n = 24$).

The chief aims of breeding are greater resistance to fruit cracking and late blight. Some selections show promise for the production of F_1 hybrids.

Sweet corn. In a test of experimental hybrids, Maryland 2 and Maryland 4 were among the best.

1806 **Farm Science and Practice. 70th Annual Report of the Ohio Agricultural Experiment Station.**
Bull. 1953 : No. 725 : Pp. 123.

Maize. The inbreds Oh. 43 and Oh. 45, released in 1949, are being used to introduce resistance to stalk rot, leaf blight, borer and aphid into hybrids.

Timothy. The new varieties Marietta, Lorian and Hopkins show promise (cf. *PBA*, Vol. XVIII, Abst. 242, and Vol. XX, Abst. 331).

Onion. Glossiness of foliage is associated with thrips resistance, and has been introduced into commercial varieties, using White Persian and a selection of Australian Brown as sources of glossiness. Thrips resistant lines have been developed but have not reached commercial standard.

Cucumber. F_1 hybrids between inbreds are being tested for greenhouse cultivation.

Tomato. A valuable selection resistant to fruit cracking has been developed. F_1 hybrids tolerant of leaf spot show promise. Work continued on the transference of mosaic resistance from *Lycopersicon hirsutum* to *L. esculentum*. Further proof that the gene for resistance to race 1 of *Fusarium* wilt is located on chromosome V has been obtained by the detection of linkage with *X* and the gene for leafy inflorescence (cf. *PBA*, Vol. XXII, Abst. 1008). The mutant character cauliflower inflorescence is inherited as a single recessive (cf. Abst. 1558). Triploids have been identified in commercial fields; trisomics derived from crosses between diploids and these triploids will be valuable in linkage tests.

1807 **Progress of Agricultural Research in Indiana. Sixty-fifth Annual Report of the Director, Purdue University Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1952** : Pp. 167.

Oats. Two spring oat selections CI 5940 and CI 5941 (Clinton x Boone-Cartier), and the winter selection 407–25–6 (Clinton x Hairy Culberson) gave the highest yields in trials.

Maize. A correlation coefficient of $r = 0{\cdot}65$ was obtained between ear length and yield.

Of the three genes *su*, su_2 and *du*, su_2 was the most efficient in increasing the amylose content of endosperm starch, without interacting with the other two; *su* and *du* interacted strongly to increase amylose content, but were less efficient independently. The gene *su* is however undesirable because of its effect of reducing total starch production and of increasing water-soluble

polysaccharides (cf. *PBA*, Vol. XXII, Abst. 364). Investigations are in progress to determine whether the highly significant negative correlation between total starch content and amylose percentage in the starch can be undermined by replacing *Su* by an allele for nonwrinkling or by other genetical methods.

Barley. Many advanced hybrids exceeded the standards Wong and Kentucky 1 in winter hardiness; some of these selections also exhibited disease resistance, good standing ability and high yielding ability.

Lines true-breeding for different reciprocal translocations have been crossed. In F_2 populations, seed set varied from 15 to 100%. When two rings of four chromosomes were involved, the frequency distributions for sterility were weakly trimodal. When one ring of six occurred, the expected ratio of 1 : 1 for the fertile and highly sterile classes was not realized. A possible interpretation based on the type of disjunction of chromosomes belonging to large rings is being sought.

Forage grasses and legumes. The effects of inbreeding upon timothy are being studied. The relationship of the combining ability of selfed and polycrossed progeny to that of the original selected clones is under investigation. A new synthetic composed of four selected clones is being compared with standard varieties. Disease resistant, high yielding synthetics of lucerne are being developed. An attempt is being made to increase methionine content by breeding.

Southern-anthracnose resistant plants of the red clover Kenland were crossed with northern-anthracnose resistant plants of Dollard and Purdue, in an attempt to obtain a variety resistant to both diseases.

Turf grasses. The effect of inbreeding upon creeping bent is under investigation. In controlled freezing tests of *Zoysia*, strains varied considerably in survival relationships at different temperatures. The most satisfactory differential data were obtained at 15° F. A positive significant correlation was found between leaf length and survival.

Water melon. Dark and light green types resistant to wilt and anthracnose were selected.

Tomato. Hybrid tomatoes are being developed. Three *Fusarium* wilt immune varieties, Kokomo, Tipton and Boone, are being released; they each carry the gene *I* for immunity from this disease. All compare favourably with Rutgers as regards yield and quality. A fourth variety, Purdue 1361, possessing the Rutgers type of wilt tolerance, is also being released. *Septoria* resistant lines have been crossed with wilt immune selections; resistance to the former disease was derived from *Lycopersicon hirsutum*. *Stemphylium* resistant lines are being developed, with the final aim of incorporating combined resistance to all three diseases in adapted strains. Wild small-fruited accessions are being used in breeding for resistance to late blight.

Snap beans. Promising disease-resistant pole and bush types were selected.

Soya bean. Perry has been released (cf. *PBA*, Vol. XXII, Abst. 3079). Types homozygous for different hilum colours are being produced for genetical studies. Resistance to frog-eye leaf spot is due to a single dominant factor (cf. Abst. 2277).

1808 **New findings for farm folk. A report of the Iowa Agricultural Experiment Station for the two years July 1, 1949 to June 30, 1951** : Pt. II : Pp. 32.

Maize. The structure and degree of development of the embryo are essentially similar in highly diverse lines. As many as 20% of the ears of open-pollinated varieties that have been selfed have exhibited mutant characters; the effect of these new types upon hybrid vigour is being investigated. Maize has been crossed with teosinte and *Tripsacum*, in the hope of obtaining valuable types for further breeding. The combining ability of autodiploid lines is under test.

Wheat x rye. Wheat and rye have been crossed to obtain wheat with winter hardiness, resistance to disease and Hessian fly, strong straw and ability to thrive on poor soils. The results have been disappointing, the most serious defect in the wheat derivatives being sterility.

1809 **Annual Report 1951-1952 of the North Dakota Agricultural Experiment Station.**
Sta. Bull. 1952 : No. 380 : Pp. 31.

Oats. In cooperation with adjoining states and the US Department of Agriculture, progress has been made in combining resistance to races 7 and 8 of stem rust and crown rust race 45.

Barley. Three rough-awned selections of good malting quality from Titan x Kindred have yielded sufficiently well to be considered for increase. They mature later than Montcalm and have stronger straw than Kindred.

Potato. B 515–2, an early maturing selection with a high degree of resistance to scab and a russet skin somewhat like Russet Burbank, may be named and released shortly. It was developed in conjunction with the US Department of Agriculture.

Equipment has been devised for evaluating new selections in respect of resistance of tubers to pressure, abrasion and impact bruises which might be encountered during transport.

Tomato. Doublerich, a new variety with a high vitamin C content, has been developed with the cooperation of the New Hampshire Agricultural Experiment Station. Further trials of Cavalier (cf. *PBA*, Vol. XXII, Abst. 2554) have confirmed the superiority of this variety for the home and market garden.

1810 **Some accomplishments of ten years of agricultural research in Montana. Fiftieth-Fifty-ninth Annual Reports of the Montana Agricultural Experiment Station, July 1, 1942-June 30, 1952** : Pp. 80.

Wheat. Spring and winter wheat breeding for resistance to sawfly is in progress. The world wheat collection is being tested for resistance to this pest. Solid-stemmed *Triticum vulgare* varieties and the Einkorn and Emmer wheats show some degree of resistance.

Bean. An attempt is being made to develop white beans of the Great Northern type combining resistance to mosaic, rust and bacterial blight.

1811 **Research for New Mexico Agriculture. Sixty-first Annual Report of the Agricultural Experiment Station, New Mexico, for the fiscal year ending June 30, 1950** : Pp. 46.

Lucerne. The new strain NM 6–268–0 has given much higher yields than New Mexico Common, apparently because of its greater resistance to bacterial and *Fusarium* wilts.

Cotton. The new strain 7133 is being increased prior to its possible release; it has given 14–40% more lint per acre than 1517B and is equal to this strain in fibre and spinning properties. Considerable attention is being given to breeding for resistance to *Verticillium* and bacterial blight. More than six genes are involved in the inheritance of seedling vigour.

Sugar beet. Curly-top resistant strains have been produced.

Capsicum. The high yielding chilli variety College 6, selected from a field of unknown varieties, has been released. It is particularly suitable for the production of green chillies for the fresh market and canning. It has shown less susceptibility to western yellow blight virus than other varieties, probably because its seedlings possess greater inherent vigour. A negative correlation has been detected between the thickness of the pod flesh and pungency. Other heritable factors however influence pungency, and in spite of this negative correlation a higher degree of pungency is expected to result from further breeding.

Pecan. Varieties were classified with respect to time of kernel development.

Onion. Progress has been made in reducing the incidence of bolting and yellow bulbs in White Grano; the variety is now to be improved with respect to uniformity in date of maturity and shape.

Pinto bean. The release of strain 2574 is planned. Rust resistance is one of the main objectives of breeding.

1812 Reunión de coordinación e información técnica sobre problemas agrícolas en Presidencia Roque Sáenz Peña (Chaco) (Hoy Pcia. Presidente Perón). [**Meeting on coordination and technical information on agricultural problems in the Roque Sáenz Peña Presidency (Chaco) (Now President Perón Province)**].
Bol. Prod. Fom. Agric., B. Aires 1952 : **4** : No. 31 : 15–65.

The following contributions are of interest to plant breeders.

Larreguy, O. C. Comportamiento de especies forrajeras ensayadas en el Estación Experimental Agrícola de Presidente Roque Sáenz Peña (Chaco) (Hoy Provincia Presidente Perón). [*Behaviour of species of forage plants tested at the President Roque Sáenz Peña Experimental Station (Chaco). (Now President Perón Province)*]. (*pp. 40–47*).

Trials with lucerne strains of different provenance have shown the strain from Saladina to be the best in yielding capacity and growth habit. Selections have been made of Hegari sorghum for grain and of Sumac Red Top for fodder. Observations have also been made on a number of other forage specimens.

Gutiérrez, M. Mejoramiento del algodón. (*Cotton improvement*). (*pp. 47–55*).

The local cotton Chaco, a selection of *Gossypium hirsutum*, has been compared with upland varieties from the USA. Tests of lint quality are being made on all the more recent selections, some of which, e.g. SP 4 and LB 16, have displayed remarkable uniformity in yield over a period of years characterized by wide variations of meteorological conditions; LB 92 has given satisfactory results in areas of low rainfall, CM 017 is extending cotton into the Santa Fe coastal belt, and Ct. 321 in irrigated zones

where it is replacing Wilds. Several other selections ready for release shortly are referred to briefly.

1813 Estación Agrícola Experimental de Palmira. Memoria 1951. (**Palmira Agricultural Experiment Station. Report for 1951**).
Minist. Agric. Colombia 1951 : Pp. 85.

Maize. After testing in top crosses, 9 lines out of a total of 1331 have been selected for use in producing hybrids. The triple hybrid Rocal H–201 has proved highly promising and is replacing Palmira V1 and V2.
A collection of local types is being established.

Rice. Observations were made on a large number of varieties and of hybrids introduced from Brazil and Peru. Twenty intervarietal crosses were made, grain being obtained from only 15 of them; the technique used in hybridization is described.

Sugar cane. Some 600 seedlings from 17 different crosses have been planted out, and selection on seedlings from previous years has been continued. Some promising canes for fodder have been selected from the crosses Mayagüez 7 x EPC 25.980 and MC 103/37 x MC 129.

Cacao. Observations were made on 1400 mother trees, from which 32 individuals yielding over 4 kg. of dry cacao per tree per year were selected; some have given as much as 8 kg. Reduced fruit set was observed in trees growing without shade.
Hormone treatment has been used successfully in increasing the set of fruit and reducing fruit drop.

Bean. Selections based on rust resistance and other characters have outyielded the local *Phaseolus* varieties.

1814 Voelcker, O. J.
Report of the Department of Agriculture of the Federation of Malaya, for the years 1950 and 1951 (1953) : Pp. 71.

Rice. The most popular local varieties are being subjected to ear-row selection for improved yield and straw strength. Hybridization is in progress to introduce the character of strong straw into Siam 29.

Cacao. Some local Trinitario selections appear to be superior in vegetative vigour to introduced Amelonado cacao, which in turn is better than seedlings from unselected local Trinitario trees. So far Trinitario selections have exhibited greater vigour than the Criollo type.

Oil palm. Most dumpy palms show a high proportion of parthenocarpic fruits and unfertilized flowers; one or two individuals however produce good fruit bunches. By breeding it should be possible to reduce these defects in otherwise promising palms. Legitimate dumpy trees have been distributed for progeny trials on estates. The production of *tenera* palms with thick pericarp and a high rate of oil extraction is aimed at. Two highly fertile *pisifera* palms have been found among *tenera* lines introduced from West Africa in 1928; their selfed progenies are to be used in breeding. Deli palm breeding continued.

Other crops. Selection of red clover, ramie, Manila hemp, tea, coconut, *Derris*, groundnut and soya bean is briefly reported.

1815 **Annual Report of the Department of Agriculture and Stock, Queensland, for the year 1951-52** (1952) : Pp. 125.

Cereals. The wheat Spica, combining high yield, good gluten strength and stem rust resistance, has been released (cf. Abst. 249).
Oat selections are being developed to provide against the possible occurrence of new races of crown rust and Victoria blight.
Work on the production of maize hybrids continued.
Some grain sorghum crosses, notably (Wheatland x Betty) x Wheatland and Feterita x Early Sumac, have provided selections bearing a large, open ellipsoidal type of head with long branches; such selections give much higher yields than the open-headed variety Coastland.
Cotton. Suitability for mechanical picking is among the objectives of breeding.
Linseed. Some pedigree selections have outyielded the commercial variety Walsh by 30–50% in initial tests.
Pawpaw. Hybrids between pure lines of Improved Petersen and Bettina have proved superior in both yield and fruit quality to either parent and to commercial strains; they are to be tested on a regional basis.
Pineapple. Clonal selection has been initiated, in addition to mass selection.

1816 Smith, H. C.
Annual Report of the Department of Agriculture, Tasmania, for 1951-52 (1952) : Pp. 46.

Wheat. Breeding for rust resistance continued, including hybridization of Macquarie and Pinnacle with resistant wheats. Parents used in the most recent crosses possessed four different types of rust resistance among them.

Potato. Preliminary work towards the establishment of a long term project of breeding disease resistant varieties was carried out. The first aim is the production of suitable types resistant to late blight and viruses.

1817 **World list of plant breeders.**
FAO Rome 1952 : Pp. 105.

As a supplement to the 1949 list of plant breeders in Canada and the USA (cf. *PBA*, Vol. XX, Abst. 685), similarly tabulated information is given regarding breeders and others engaged in varietal improvement in most countries participating in FAO.

1818 Åkerman, Å.
Aktuellt på årets försöksfält. (**News from the year's experiment plots**).
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 395–400.

Having expressed the confidence of the Swedish Seed Association in modern breeding methods based on induced changes in chromosome number and artificially produced mutations, the speaker gave a brief account of the breeding plots of cereals, herbage plants, potatoes, root crops, flax and oil crops.

1819 Banga, O.
Protection of the breeder's work.
Meded. Inst. Vered. TuinbGewass. 1952 : No. 33 : Pp. 16.

The legislative problems involved in a suitable standard nomenclature for varieties and selections, in the protection of the rights of breeders and seed firms, and in the admission of varieties to the trade are discussed, and procedures are suggested for the effective protection of these rights on an international basis (cf. Abst. 598).

1820 **Chapter V—Technical Divisions. A. Agriculture. Program of work and budget for 1953 as approved by the sixteenth session of the council.**
FAO, Rome 1952 : 41–66.

Seed production and distribution. The supplying of seed of new crops and improved varieties for experimental purposes, and other general activities are to be continued.

A regional programme of wheat breeding in the Near East was initiated in 1952 (cf. Abst. 973). A second meeting of wheat breeders of Turkey and the other countries concerned is to be held in 1953.

The sixth meeting of European breeders of hybrid maize is to take place in Portugal during 1953, to review the results of trials carried out in 23 countries in 1952 and to promote further cooperation in the exchange of information and material. It has been decided to discontinue the uniform tests of American hybrids and to concentrate on trials of hybrids produced locally (cf. Abst. 973).

A further meeting of the working party on rice breeding in south-east Asia is to be arranged (cf. Abst. 973).

The world lists of genetic stocks of wheat and rice are to be expanded; further information is also to be compiled on plant breeding personnel (cf. Abst. 1817). A card index of information on the origin, adaptation and superior characteristics of new varieties of crops, particularly cereals, is to be maintained.

1821 Dabral, B. M.
The utilization of hybrid vigour in the improvement of crop plants in Uttar Pradesh.
Agric. Anim. Husb. Uttar Pradesh 1950 : **6** : Sect. IV : 27–43.

The use of hybrid vigour in crop improvement in the United States and other countries is surveyed. Possibilities of the practical exploitation of hybrid vigour in maize, *Pennisetum typhoideum*, cotton and other crops cultivated in Uttar Pradesh are discussed.

1822 Koopman, C.
Wat mogen wij van het verhogen van het aantal chromosomen verwachten? (**What may we expect from increasing the number of chromosomes ?**)
Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1952 : **9** : 60–61.

The significance of induced polyploidy as a factor making for the improvement of agricultural crop plants is estimated with special reference to cereals, clover, grasses, turnips and beets. The potential value of chromosome doubling in facilitating interspecific crossing is exemplified with reference to wheat and potatoes.

1823 Kuznecov, V. M.
(**Searching for promising plants in the Altaï**).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.) Moskva-Leningrad 1950 : No. 5 : 50–56. [Russian].

A collection of wild plants made in the Altaï included two forms of *Agropyron* bearing mycorhizal roots, a productive tall grass species with tender stems resembling *Glyceria*, a vigorous *Lathyrus* species with lush leaves, some early and hardy forms of currants, a gooseberry carrying resistance to *Sphaerotheca*, and edible forms of *Allium Schoenoprasum* and *A. victorialis*.

1824 Burkill, I. H.
Habits of man and the origins of the cultivated plants of the Old World.
Proc. Linn. Soc. Lond. 1953 : **164** : 12–42.
A discursive but informative discussion is given of the possible origin of many major and minor crops of the Old World, temperate and tropical, with reference to ancient history, philological evidence and anthropological observations. Vavilov's theory of centres of origin is fundamentally criticized on the grounds that it is based solely on observations on plants, disregarding the cultivator; the diverse flora of mountains can be ascribed to the abundance of microclimates and to the nature of cultivation in such regions, both of which factors favour the persistence of variability. The disposition of some of Vavilov's centres of origin is also criticized from the aspects of geographical isolation and prehistoric human migrations.

1825 Kleczkowski, A.
A method for testing results of infectivity tests with plant viruses for compatibility with hypotheses.
J. Gen. Microbiol. 1953 : **8** : 295–301.
A statistical method for testing the compatibility of results of lesion counts with an hypothesis predicting quantitative changes in infectivity is described. The method allows the variance ratio test to be applied. It involves establishing a relation between numbers of lesions and virus concentration for each experiment and a logarithmic transformation of lesion counts to make variance independent of the magnitude of the variate. Its application is illustrated using results of an investigation to determine whether inactivation of virus by ultraviolet radiation is a reaction of the first order.

1826 **Forty-fourth Annual Report of the Norfolk Agricultural Station, 1951-52** (1953) : Pp. 16.
The results of variety trials of wheat, oats, barley, potato and fodder beet are summarized. The new malting barley Proctor (cf. Abst. 1180) is concluded to be a better variety on the whole than Kenia and at least as good as Spratt Archer.

1827 **Annual Report and Statement of Accounts of the Overseas Food Corporation for the year ended 31 March, 1952** : Pp. 109.
Results of varietal trials of maize, sorghum, cotton, castor bean, sunflower, safflower, groundnut, soya bean and some minor crops are presented for the Kongwa, Urambo and Nachingwea areas of Tanganyika.

1828 Bjaanes, M.
Forsøk med toradsbygg på Møystad Forsøksgard og på spredte felter i distriktet 1947–51. Domen 01435, en ny stråstiv torads sort. (**Trials with two-rowed barley at Møystad Experimental Farm and outlying plots in the district, 1947-51. Domen 01435, a new stiff-strawed, two-rowed variety**).
Forskn. Fors. Landbr. 1952 : **3** : 273–97.
The barleys tested during 1947–51 included the 2-rowed varieties Maja, Opal B, Domen (cf. Absts. 1200 and 1959), Freja, Ymer and Goliat and the 6-rowed Varde. The 2-rowed Herta was first entered in these trials in 1949.
The 2-rowed, remarkably stiff, *nutans* barley Domen, derived from a cross of the 6-rowed Norwegian barley Maskin and the 2-rowed Danish variety Opal, surpasses both parents in yield and strength of straw, but ripens 3 days after Opal. It is specially suited for rich soils with liberal manuring. On inferior soil it does not equal Maja and Ymer.

CEREALS

1829 Horne, F. R.
Cereal agronomy.
Chem. & Ind. 1953 : 46–51.
Yielding capacity, strength of straw, quality, soil fertility, sprouting, disease resistance and several other problems of the production of wheat, oats and barley in Britain are discussed in detail, with reference to different types of varieties and to breeding.

1830 Nicholson, G.
Oat and barley varieties recommended for 1953 sowings.
Agric. Gaz. N.S.W. 1952 : **63** : 631–32, 668–69.
Varieties of oats and barley recommended for different districts in New South Wales are listed. Descriptive notes are given on the oat varieties.

1831 Harrington, J. B.
Cereal breeding procedures.
FAO, Rome 1952 : No. 28 : Pp. 122.
This publication is intended primarily for agricultural personnel in relatively underdeveloped regions. Under the following main headings it clearly describes in considerable detail the procedures involved in programmes of breeding wheat, rice and other small grains: introduction and selection; hybridization; recording; plot size designations and types of yield trials; system of variety testing; numbering and

labelling; planning tests; note-taking and summarizing; nursery testing; replicated plot testing; laboratory and greenhouse testing; variety purification and increase; analysing and reporting results; and equipment, facilities and assistance. A glossary, short list of reference books and 16 appendices complete this useful publication.

1832 MEDINEC, V. D.
(The dynamics of yield from the viewpoint of the accumulation of dry matter during different growth phases).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 22–27. [Russian].

The productiveness of such cereal varieties as the wheat Lutescens 62 and barley Jubileĭnyĭ [Jubilee] in the Harjkov province is associated with their capacity for a quick accumulation of dry matter and for its more complete incorporation in the grain.

1833 DE HAAN, H.
Maintaining varieties of self-fertilized crop plants.
Euphytica, Wageningen 1953 : **2** : 37–45.

Techniques employed in the Netherlands to maintain the initial purity of improved varieties, land races and parental stocks are outlined, with particular reference to cereals.

1834 DIEHL, R.
Quelques aspects de la résistance au froid chez les céréales d'hiver. (**Some aspects of cold resistance in winter cereals**).
Ann. Inst. Nat. Rech. Agron., Paris 1952 : **2** : Sér. B : 257–303.

The subject is treated at length from the standpoints of the various effects of cold; plant recovery from damage and variation in resistance; and the physiological and morphological characters of the plant in relation to its resistance. No single factor can be said to determine cold resistance, but a high density of stomata, small cells and a relatively reduced primary root system as compared with the leaf system may be regarded as playing an essential role in protection against cold.

1835 KIMHI, A.
(The lesson of the 1951 drought in the Arab villages).
Hassadeh 1952 : **32** : 266–67. [Hebrew].

A survey of drought damage in Arab crops in 1951 revealed marked varietal differences in resistance to drought.

Barley. Shesh Turit (Six-rowed) suffered less than BMC and the local variety Farkadi.
Wheat. Gesri did comparatively well. Its yields did not fall below 80 kg. per dunam, even in the driest districts. Gesri is synonymous with Zariah and Gatman. Its ear has some resemblance to those of the Australian wheats. The grain is hard and bright yellow like those of the native Transjordan varieties. Kharsouni did considerably better than Norsi.
Oats. The variety Molga, used for stock feeding, survived the drought.

1836 GUYOT, L. & MASSENOT, M.
Dix ans d'expérimentation sur la rouille noire des céréales (1941–1950). [**Ten years' experiments on black rust of cereals (1941-50)**].
Ann. Inst. Nat. Agron., Paris 1952 : **3** : Sér. C : 351–91.

This is an extended report on the work already reviewed from another source (cf. *PBA*, Vol. XXII, Abst. 2525).

1837 SIMMONDS, P. M.
Rootrots of cereals. II.
Bot. Rev. 1953 : **19** : 131–46.

A summary of relevant world literature which has appeared since the first review (cf. *PBA*, Vol. X, Abst. 14) includes references to breeding in progress for improved root rot resistance and to studies on pathogenic variability.

1838 KOFOED, A. DAM
52.Beretning om Planteavlsarbejdet i Landboforeningerne i Jylland. (**Fifty-second report on plant cultivation work under the agricultural associations in Jutland**).
Skanderborg 1952 (1953) : Pp. 608.

This report contains records of the local field experiments carried out by the numerous agricultural associations in various parts of Jutland. The crops tested include cereals, herbage legumes, meadow grasses, potatoes, root crops, onions and peas (cf. *PBA*, Vol. XXII, Abst. 2566).

1839 RASMUSSEN, L.
Beretning om Landboforeningernes Virksomhed for Planteavlen paa Sjælland 1952. (**Report on the plant cultivation work of the agricultural associations in Sjælland, 1952**).
Beretn. Planteavl. Sjælland 1953 : Pp. 398.

Local field experiments in various localities in Sjælland are recorded (cf. *PBA*, Vol. XXII, Abst. 1738). The crops tested included varieties and strains of wheat, rye, oats, barley, clover,

lucerne, vetch, potatoes, root crops, flax, peas and beans.

1840 VALDEYRON, G. & SÉGUÉLA, J. M.
La comparaison des variétés dans la sélection des céréales. 1. Essais comparatifs régionaux de variétés de blés. (**The comparison of varieties in cereal breeding. 1. Regional comparative trials of varieties of wheat**).
Ann. Serv. Bot. Tunis. 1949 : **22** : 141–80.

The Director of the Botanical and Agronomic Service of Tunisia and the Head of the Plant Genetics Laboratory of that Service have collaborated in this detailed account of the organization and methods used in regional variety trials of wheat in Tunisia. The concluding section deals with the statistical interpretation of results and comprises an annotated list recording the origin, qualities and performance of the following wheats: E.A.P. 63A; Mahmoudi 552; Chili; Kasserine; Hedba x Kahla 967; D 115, Derbessi x (Biskri x M'Rari); D 116, Sbéï x M'Rari; D 117, Mahmoudi x M'Rari; and T 111bis, Pusa x (Florence x Aurore). (Cf. *PBA*, Vol. XXI, Abst. 2450).

1841 SCHENDEL, U.
Die Wirkung künstlicher Beregnung in Sortenversuchen bei Winterweizen, Wintergerste, Erbsen und Kartoffeln. (**The effect of artificial rain in variety tests with winter wheat, winter barley, peas and potatoes**).
Z. PflErnähr. Düng. 1952 : **59** : 27–48.

The results were considerably altered by the application of artificial rain. The variety Rimpau's Bastard [Rimpau's Hybrid] showed the best reponse to artificial rain among the winter wheats, Kalkreuther in the winter barleys, Victoria varieties in the peas, and Toni and Immertreu in the potatoes.

WHEAT

1842 MJAGKOV, N. V.
(**The penetration of hard wheat into new districts**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 66–67. [Russian].

A promising hard wheat was developed in the Ivanov province from some grains of *Triticum durum* type, found in the ears of a local soft wheat. It is hardy, early and vigorous, shows resistance to loose smut and shedding, threshes with ease and develops three or more productive tillers per plant. The ears are large and compact. The grain is vitreous and the 1000 kernel weight is 60 grm. Mention is made of two varieties of white-eared soft wheat, an awned and an awnless type, which have been recently developed in the Putež district. They are more productive and less susceptible to loose smut than Lutescens 62.

1843 BECKMAN, I.
O novo trigo "Bagé" na sua região de adatação. (**The new wheat Bagé in its region of adaptation**).
Agros, Rio Grande do Sul 1951 : **4** : 48–52.

Figures are given showing the behaviour of 11 hybrids produced by experimental stations in the Brazilian state of Rio Grande do Sul, showing the superiority of the varieties Bagé, Colônias and Trintani in all zones except those affected by the excessively acid conditions found in the northern part of the state; Trapeano and Patriarca proved resistant to this condition. Since Bagé is somewhat earlier than Colônias and Trintani and excels them in late sowings, it is the only one of the three to be released.

1844 SILVA, A. R. DA
Bases para um plano nacional de pesquisas de trigo. (**Basis for a national plan of wheat research**).
Agros, Rio Grande do Sul 1950 : **3** : 75–83.

Under genetics, determination of the biotypes of the main pathogens and the inheritance of resistance to them come highest in the list of subjects requiring study in Brazil.

1845 SOARES SBO., J. A. S. & REIS, L. P.
Experiências preliminares sôbre métodos de preservação do ataque de pragas dos grãos em material fitotécnico de trigo depositado em celeiros e laboratórios. (**Preliminary experiments on methods of preserving grain from insect attack, in wheat breeding material stored in granaries or in the laboratory**).
Agros, Rio Grande do Sul 1950 : **3** : 235–40.

Modern insecticides such as DDT, Gammexane and Rodiotax proved more effective than previous methods of treating the material with carbon bisulphide, and caused no diminution of germinating capacity.

1846 LJAŠČENKO, I. F.
(**The biological properties of alternative wheats**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 17–21. [Russian].

At the Azov-Don Research Station alternative

habit was fixed in an Armenian winter wheat var. *hamadanicum* and the winter wheats Erythrospermum 0·3, 0·9 and 04655, originating from the Kirgizian Breeding Station, by growing them for several generations as spring wheats and selecting the types with a spring habit. The effects of winter cultivation for one or several years upon the biological properties of some lines of these alternative wheats have been investigated.

1847 Fajersson, F.
Weibulls original Bancovete (W. 10752). [**Weibull's Banco wheat (W. 10752)**].
Weibulls Ill. Årsb. 1953 : **48** : 3–6.

This new, high yielding winter wheat, suitable for southern Sweden, was bred from a cross of W 6518 and W 6431 followed by further hybridization with the winter hardy Ankar II [Anchor II]. Both the original parents are derivatives of the Hungarian wheat Bánkút 178 and the Swedish varieties Ankar and Saxo. Banco, which has shorter straw than Eroica, scored 9·8 out of 10 for strength of straw, as compared with 9·5 for Eroica. At Weibullsholm during 1945–52, Banco ripened on the average 3 days before Eroica. Its apparently satisfactory resistance to disease may explain its overwintering capacity in mild years in Östergötland, though under the severe conditions in 1946–47 it proved inferior to Eroica.

1848 Fajersson, F.
Weibulls original Ertusvete (W. 11746). [**Weibull's Ertus wheat (W. 11746)**].
Weibulls Ill. Årsb. 1953 : **48** : 7–10.

This new high yielding and very winter-hardy, short-strawed, autumn wheat for central Sweden is derived from a cross between Eroica and Virtus. In official trials it has outyielded all competitors except Virtus, which it equalled in yield. Its winter hardiness, strength of straw and disease resistance are good and its quality is outstanding.

1849 Johnson, V. A.
Factors affecting plant height in winter wheat.
Abstr. Doct. Diss. Univ. Neb. 1952 : 21–25.

Evidence for the partial dominance of tallness over dwarfness, and transgressive segregation of tall stature, was obtained from F_1, F_2 and F_3 progeny analyses of Pawnee x CI 12250 and Cheyenne x CI 12250. A negatively skewed F_3 frequency distribution and a population mean larger than the mean of the parents in the cross Norin 10 x CI 12250 suggest that a relatively small number of partially dominant genes control plant height. Length of internode, rather than number of internodes, proved to be associated with height differences, but environmental factors such as length of photoperiod, light intensity and water supply were shown to influence height considerably.

1850 Smirnov, P. I.
(**Breeding and seed growing at the Tadžik State Breeding Station**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 8 : 41–43. [Russian].

The development of new and improvement of existing varieties of cereals are referred to. A productive wheat, Lutescens 16, has been bred recently from a local Surhak wheat and an *albidum* form originating from Africa. It has large white awnless ears and shows resistance to lodging. Standards of various economic plants, some of which have been previously developed at the breeding station, are listed.

1851 Pronin, V. A.
(**Artificial mixtures of spring wheat varieties under the conditions of the Penza province**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 27–31. [Russian].

At the Petrovskaja Breeding Station, the effects of sowing Lutescens 62 seed in mixtures with Saratov 27, Melanopus 69, Akmolinka or Šortandinka [Šortanda] upon productiveness were investigated. The ratios of Lutescens 62 to the other varieties were 100 : 0, 75 : 25, 50 : 50, 25 : 75 and 0 : 100. The most productive mixture was 50 : 50 Lutescens 62 + Saratov 27; it outyielded pure Lutescens 62 by 1·2 c. and Saratov 27 by 1·7 c. per ha.

1852 Simonet, M.
Sur l'étude méiotique des hybrides *Aegilops ventricosa* avec des *Triticum* tétraploïdes et de leurs trihybrides *Ae. ventricosa* x *T. durum* et *Ae. ventricosa* x *T. dicoccum* avec *Triticum vulgare*. (**On the meiotic study of the hybrids *Ae. ventricosa* with tetraploid forms of *Triticum* and their triple hybrids *Ae. ventricosa* x *T. durum* and *Ae. ventricosa* x *T. dicoccum* with *T. vulgare***).
Ann. Inst. Nat. Rech. Agron., Paris 1952 : **2** : Sér. B : 175–88.

The somewhat similar chromosome associations observed in the highly irregular reduction

division of the *Aegilotricum* F_1 ($2n = 28$) obtained from crosses of *Ae. ventricosa* with *T. dicoccoides*, *T. durum*, *T. dicoccum* and *T. Timopheevi* respectively are described in detail. The article deals, however, mainly with the triple hybrids (*Ae. ventricosa* x *T. durum*) x *T. vulgare* and (*Ae. ventricosa* x *T. dicoccum*) x *T. vulgare*, of which the 35 plants obtained had chromosome numbers ranging between $2n = 46$ and $2n = 50$, thirteen having $2n = 49$. These hybrids are derived from unreduced tetraploid ovules and are fairly fertile. At meiosis 8–9 univalents are observed, indicating, in the writer's opinion, the existence of marked homology between the C genome of *T. vulgare* and one of the two *Ae. ventricosa* genomes. Possibly the resistance of the latter species to *Cercosporella herpotrichoides* might be transferable to the C genome of *T. vulgare* by crossing over. Plants of the above two triple hybrids, obtained from crosses involving Vilmorin 27, are to be studied from this point of view.

1853 Malato-Beliz, J.
Dos nuevas variedades botánicas de "*Triticum polonicum*" L. (**Two new botanical varieties of *T. polonicum* L.**).
Bol. Inst. Invest. Agron., Madr. 1952 : **12** : 589–91.

Two awnless forms, thought to be hybrids of *T. polonicum* and *T. aestivum*, are described as var. *Tellezii* and var. *Ciferrii* of *T. polonicum*.

1854 Nakajima, G.
(**Cytogenetical studies on F_1 plants of *T. dicoccum* x *S. cereale*).**
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 67–68. [Japanese]. (Abst.).

A morphological and cytological description is given of the F_1 hybrid of *Triticum dicoccum* x *Secale cereale*. There are 21 chromosomes, the number of bivalents at meiosis being 0–3, together with 15–21 univalents. At anaphase I, the chromosomes separate in a numerical ratio varying from 11 : 10 to 21 : 0. Meiosis II is irregular with resultant sterility.

1855 Jensen, N. F. & Kent, G. C.
Disease resistance from a wheat x rye cross.
J. Hered. 1952 : **43** : p. 242.

A single winter wheat plant (Cornell Sel. 779b10–8–6), resistant to both leaf rust and mildew, was discovered in 1942 in a wheat x rye progeny. Its pedigree is as follows: the original cross was Honor x Rosen rye; the F_1 was back-crossed to Honor; F_4 selections were crossed to Yorkwin. Morphologically the selection resembles wheat, except for the rye characteristic of hairy neck; it has normal self fertility. Its leaf-rust resistance appears to be of the mature-plant type. In crosses with other wheats, Sel. 779b10–8–6 has been fully compatible. In both the smooth and hairy-necked segregates obtained, resistance to leaf rust and mildew has been closely associated. The disease resistance of Sel. 779b10–8–6 could have originated by transfer, in the original hybrid, of rye chromatin by crossing-over, or reciprocal translocation, followed by an unusual recombination of genes in the final hybrid. The presence of hairy neck provides evidence that such transfer did in fact take place.

1856 Pope, W. K. & Love, R. M.
Comparative cytology of colchicine-induced amphidiploids of interspecific hybrids: *Agropyron trichophorum* x *Triticum durum*, *T. timopheevi* and *T. macha*.
Hilgardia 1952 : **21** : 411–29.

Morphological and cytological investigations have been carried out on F_1 hybrids of *Triticum durum*, *T. Timopheevi* and *T. Macha* with *Agropyron trichophorum* ($2n = 42$) and on their derivatives, including colchicine-induced amphidiploids (cf. *PBA*, Vol. XVI, Abst. 715). The highly sterile F_1 hybrids were morphologically intermediate between their parents; they showed some regular meiotic pairing. The C_1 amphidiploids closely resembled the corresponding F_1 hybrids, except the *T. Macha* x *A. trichophorum* amphidiploid, which was taller, coarser and more weakly perennial. The amphidiploids each had the expected doubled number of chromosomes; they usually showed a failure of complete pairing. No relationship was detected between pairing in the F_1 plants and multivalent association in the C_1 amphidiploids; the number of multivalents was almost the same in corresponding F_1 and C_1 plants. Failure of complete pairing in the amphidiploids is attributed to a disharmonious interaction between parental genes controlling the same cell processes. In one *T. durum* hybrid and its amphidiploids evidence of a genetic suppression of synapsis was obtained. The C_2 progenies showed a general decrease in vigour, fertility and total number of paired chromosomes.

1857 Sears, E. R.
Addition of the genome of *Haynaldia villosa* to *Triticum aestivum*.
Amer. J. Bot. 1953 : **40** : 168–74.

The chromosome complement of the hybrid

($2n = 21$) between *T. dicoccoides* ($2n = 28$) and *H. villosa* ($2n = 14$) was doubled by colchicine treatment (cf. *PBA*, Vol. XVIII, Abst. 829). The resulting allohexaploid, having the genomic formula AABBVV, crossed readily with the hexaploid *T. aestivum* (AABBDD). By backcrossing to *T. aestivum*, two individuals combining the complete genome of *T. aestivum* with the seven univalents of *H. villosa* were obtained (AABBDDV). AABBDV hybrids with DV chromosome pairs, and also trivalents and quadrivalents involving association of chromosomes of the D and V genomes with chromosome pairs of the genomes A and B, were occasionally observed. There was a tendency for combinations of univalents to pass to the same pole during gamete formation; gametes with low or medium numbers of univalents appeared to be eliminated. The average numbers of D and V univalents transmitted to subsequent progenies by AABBDV hybrids were 3·78 and 3·89 respectively, indicating that the frequency of elimination of chromosomes was approximately the same for both D and V genomes.

1858 Hyde, B. B.
Addition of individual *Haynaldia villosa* chromosomes to hexaploid wheat.
Amer. J. Bot. 1953 : **40** : 174–82.

Since the seven chromosomes of the V genome of *H. villosa* have shown little homology with the other genomes of the Triticinae (cf. Abst. 1857), the unlikelihood of crossing over has facilitated a systematic attempt to add individual chromosomes or chromosome pairs of *H. villosa* to Chinese Spring wheat (*T. aestivum*). Five disomics and six monosomics have been obtained. Modifications of *T. aestivum* caused by alien chromosomes are restricted to increase in spike density, change of coleoptile colour, increase in asynapsis and general decrease in vigour and fertility. It is pointed out that the small effect of *Haynaldia* chromosomes is probably due to the large ratio of *Triticum* genes present; many of the *Haynaldia* genes may lose their dominance in a foreign genetic background. Meiosis was comparatively regular in the monosomics and disomics studied and there was little tendency to eliminate the alien chromosomes. Although pollen with an *Haynaldia* monosome rarely functioned, it was noted that addition disomics arose in the progeny of selfed monosomics, particularly when the proportion of normal pollen was reduced so that monosomic pollen had less competition.

1859 Bell, G. D. H. & Sachs, L.
Investigations in the Triticinae. II. The cytology and fertility of intergeneric and interspecific F_1 hybrids and their derived amphidiploids.
J. Agric. Sci. 1953 : **43** : 105–15.

Results of detailed cytological analyses of the sterile F_1 of 16 intergeneric crosses involving *Triticum*, *Aegilops* and *Agropyron* and 6 interspecific crosses within *Triticum* are compared with those of similar analyses of the parental species and of fertile amphidiploids (A^0) obtained from the F_1 by colchicine treatment (cf. *PBA*, Vol. XXI, Abst. 1747). A relatively high degree of chromosome pairing at meiosis was noted in the interspecific F_1 hybrids, while the intergeneric F_1 was characterized by a low incidence or absence of pairing. In all A^1 amphidiploid generations, pairing was, however, almost complete; multivalents in the A^1 were less common than bivalents in the undoubled F_1. In all cases there was a reduction in the chiasma frequency per nucleus and per bivalent of the amphidiploid compared with its parent species, but the degree of reduction was not directly associated with either chromosome complement or the number of multivalents. In so far as chromosome pairing at metaphase I is a criterion of chromosomal homology, there was no indication that the extent of multivalent formation in amphidiploids is a more sensitive index than the extent of bivalent formation in the F_1. It was also shown that the occurrence of multivalents does not necessarily determine the fertility of amphidiploids.
A high degree of fertility observed in some newly derived amphidiploids having a reduced chromosome complement suggests that the chromosomes of one genome may compensate for the loss of chromosomes of the other species. This capacity for the survival of deficient gametes is lost in subsequent amphidiploid generations.

1860 Yamashita, K.
(Studies on reciprocal translocations in Einkorn: two homozygous RT types).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 110–12. (Abst.). [Japanese].

By intercrossing a series of X-ray-induced reciprocal translocation types of *Triticum monococcum* and *T. aegilopoides*, two homozygous translocation types were obtained, with the chromosome constitutions a–b c–d e–f g and a b–c d–e f g, respectively. In both these types,

7 bivalents were formed at meiosis. On crossing these two individuals, the heterozygote

$$\frac{\text{a–b c–d e–f g}}{\text{a b–c d–e f g}}$$

was produced, which formed a ring of 12 chromosomes and 1 bivalent at meiotic metaphase.

1861 Eljkina, E. L.
(Training spring wheat hybrids).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 8 : 7–18. [Russian].

At Biïsk, a quick method of breeding spring wheat has been developed. Hybrids from various crosses between spring and winter wheats were grown in the glasshouse until they reached the tillering stage and were then transplanted to the field. Some material was so treated in the F_1, other material in the F_1 and F_2. The conditions in the glasshouse intensified the development of new forms as well as of spring types. The method also gave a higher percentage of survival of the hybrid material. New forms produced by some hybrids in the F_1 and F_2 included other botanical varieties than those involved in the crosses. The F_2 grown in the glasshouse showed a great variability in respect of 1000 seed weights and dates of maturity. Many early lines were selected from various crosses, including those between the following spring wheats and the promising winter wheat, B–3, bred recently at Biïsk: Albidum 25629, Erynaceum 39–126, Horanka 4615, Ferrugineum 685/21, Lutescens 13–97, Red Bobs, Lutescens 62 and Lutescens 32080.

1862 Badanin, P. A.
(Growing heterogeneous plants of spring wheat for intravarietal hybridization).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : p. 69. [Russian].

The numbers of grains borne on each ear and of productive tillers on each plant, the 1000 seed weight and the length of ear of a local wheat var. *melanopus* were improved in the Kuïbyšev province by intravarietal open pollination and differential training of the male and female parents. This included varied seed treatments and cultivation upon soils of different pH.

1863 Lochow, J. v.
Versuche über Auswuchsfestigkeit von Weizen. **(Experiments on resistance to sprouting of wheat).**
Agri. Hort. Genet., Landskrona 1952 : **10** : 113–40.

In this study of dormancy no genetically conditioned relation between protein content and resistance could be found. An apparent physiological relationship could, it was found, be readily disturbed by varying the developmental rhythm.

In one year's experimentation two varieties have been discovered which, though to some extent resistant to sprouting in the ear, germinated faster in the field than other comparable varieties.

1864 Turbin, N. V.
(The effect of self pollen upon vitality of hybrid progeny from multiparental crosses).
Ž. Obščeï Biol. (J. Gen. Biol.) 1952 : **13** : 306–10. [Russian].

The results of recent Soviet investigations into multiparental hybridization, including the writer's own research with wheat (cf. Abst. 1863) and tomatoes (cf. *PBA*, Vol. XXII, Abst. 3056) are discussed from the Mičurinite viewpoint.

It is concluded that heterosis occurs in material pollinated with mixed foreign pollen immediately or soon after selfing.

1865 Turbin, N. V. & Palilov, A. I.
(The emasculation of maternal parents for intervarietal open pollination of wheat).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 7–14. [Russian].

At Leningrad, various methods of preparing material for intervarietal free crosses have been investigated. Preliminary results of the experiments suggest that heterotic seed can be obtained by free pollination without the removal of anthers from the maternal plants or trimming of their paleae. The method consists of excising all central florets and clipping the underdeveloped spikelets from the apical and basal ends of the ear. Some heterotic seed was obtained from multiparental crosses involving Diamant [Diamond] and Tulun 70 as the female parents. The pollinators for Tulun 70, and for some Diamant plants, were Diamant, Tulun 70, Tulun 3A/32, Severjanka [Northerner], Pamjatj Urala [Ural Memorial], the uncertified varieties LGS–12 and LGS–4 and line 48. Other Diamant plants were open-pollinated with Moskovka 48 [Moscow 48], Kauka, Lutescens 62, Milturum 553, PPG 22850 and Albidum 3700.

1866 PAL, B. P., RAMANUJAM, S. & MEMON, A. R.
Evaluation of vegetative characters as classificatory aids in classifying crop plants. I. Leaf-hairiness in *Triticum*.
Indian J. Genet. 1952 : **12** : 15–24.

The variation in the pattern, length, density and other characters of the hairs of the auricles, leaf epidermis and margin, and sheath epidermis and margin was determined in *Triticum* spp. and varieties. It is concluded that leaf hairiness can be used taxonomically, since the character exhibits sufficient variation of a discontinuous nature. The use of hairiness requires caution, however, in view of environmental variation and the difficulties of evaluating the character.

1867 MELJNIKOV, N. I.
(High quality varieties of wheat must be developed).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 19–21. [Russian].

Many hardy and productive wheats, showing resistance to diseases, which have been developed in recent years in the USSR have indifferent baking and milling properties. Testing new material for quality during the breeding process and improvements in the organization of laboratory trials are urged.

1868 MATWEEF, M.
Les recherches sur la valeur industrielle des blés durs au cours de la période 1946–1948. **(Investigations on the industrial value of the hard wheats during the period 1946-48).**
Ann. Serv. Bot. Tunis. 1949 : **22** : 97–122.

The various techniques used in testing the quality of the new breeding lines produced each year by the Genetics Laboratory, Tunis, are described, with tables showing the results obtained from the varieties and selections when grown in different localities.

1869 SUNDBERG, D. F., HAYASHI, R. & BARMORE, M. A.
A cake baking method for evaluating wheat varieties.
Cereal Chem. 1953 : **30** : 1–11.

Using the soft wheat varieties Baart, Elgin and Hymar, a two-stage method of mixing cake batters was found to be more satisfactory for evaluating varietal differences in baking quality than a single-stage method.

1870 JONGH, G.
The baking value of wheat varieties grown in the Netherlands.
Euphytica, Wageningen 1953 : **2** : 6–14.

A standardized test of dough consistency after the last fermentation period is shown to be a more accurate means of determining the relative baking quality of 11 wheats than tests carried out at the beginning of fermentation. The varietal differences established by the test were correlated with gluten quality. Those varieties with rather stiff gluten showed no significant improvement in baking quality when bromate was added to the dough; on the other hand, those of poorer baking quality responded well. It is considered improbable that the quality of local wheats will be improved by breeding for increased gluten quantity, unless the quality of gluten can be raised at the same time.

1871 MALATO-BELIZ, J.
Novos trigos Portugueses; classificação e descrição botanica. **(New Portuguese wheats; classification and botanical description).**
Melhoramento 1952 : **5** : 5–20.

The following hybrid varieties produced at the plant breeding station at Elvas, Portugal, are illustrated and described: Sagres, Condestável, Moreno, Lusitano, Gil Vaz, Africano, Raiano, Peninsular, Salvador and Amarelejo.

1872 WEIBULL, G.
Sortspridning inom våra stråsädesslag. **(The varietal distribution among our cereals).**
Weibulls Ill. Årsb. 1953 : **48** : 11–22.

In continuation of previous reviews (cf. *PBA*, Vol. XVI, Abst. 697 and Vol. XXI, Abst. 1675), a statistical survey has been drawn up, showing the importance and distribution of Swedish bred and other wheats in Sweden during 1930–51.

1873 AZZI, G.
Le basi ecologiche della evoluzione del grano. **(The ecological basis of the evolution of wheat).**
Riv. Ecol. 1952 : **2** : 139–55.

The potent role that ecological features may play in selecting types with particular growth rhythms is illustrated by the wheats of Siberia, all capable of completing their development in very short time and at minimum temperatures; of China, capable of maturing under conditions of intense rainfall and high humidity extremely favourable to attack by rust and other fungi; and of Formosa and southern Japan, extremely resistant to lodging. Lists are given of the varieties known to be most resistant to drought, lodging, excessive humidity, cold and high temperature respectively, and indications are given of the ecological characteristics of *Triticum durum*, *T. Spelta* and *T. turgidum*.
In areas favourable to wheat growing, ecological differentiation is less pronounced and the

varieties tend to differ more in morphological features and in features imposed by man such as quality and yielding capacity. Certain special areas however contain varieties possessed of particular characters of value in agriculture, such as resistance to sudden hot spells in the wheat Biancone of Elba, rust resistance in Rieti, drought resistance in Coccitta wheat from the mountains of the Messina province, cold resistance in the mountain wheat from Garfagnana, earliness combined with drought resistance in Richelle Hâtive [Early Richelle], tolerance of low summer temperature in Hen Gymro, freedom from shedding in the wheat from Castiglione di Sicilia, and unusually high yield combined with earliness in the wheat Marzatico from the Abruzzo.

1874 Fiedler, J.
Vztahy mezi vyspělostí a velikostí zrna a výnosy. (**The relationship between maturity, size and yield of grain**).
Sborn. Čsl. Acad. Zeměd. 1952 : **25** : 571–73.

The differential effect of sowing wheat with large or small seed upon productiveness was investigated. The yielding capacity of the material was calculated by a method based on venation of the first leaves.

1875 Godunova, K. N.
(**Varieties of spring wheat for growing under irrigation in the Southeast and agricultural methods for their cultivation**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 8 : 52–59. [Russian].

Several hard and soft wheats adapted to cultivation under irrigation in the Kuĭbyšev, Saratov, Stalingrad, Astrahanj and Čkalov provinces are listed. Some of them are still under trial. Lutescens 758 showed appreciable increases in yield and 1000 seed weight when tested under irrigation. It also showed resistance to lodging and fungous diseases.

1876 Gurčenko, V. S.
(**The best varieties of spring wheat for irrigated land in Siberia**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 14–19. [Russian].

Iskra [Spark], bred at Čeljabinsk, and Milturum 553, Albidum 3700 and Smena [Change], developed at Omsk, are described. They produce large grain with good baking and milling properties and outyield the standard Milturum 321, when grown on irrigated land. These varieties show resistance to lodging, shedding, and diseases, although Smena is susceptible to loose smut and Albidum 3700 to smut and bunt.

1877 Lovčikov, I. S.
(**For the quicker introduction of new standard varieties of hard spring wheat**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 39–45. [Russian].

Čakinskaja 226, Hordeiforme 496, Hordeiforme 1404, Hordeiforme 4 and Don 309, developed in recent years in the USSR, show resistance to lodging, shedding, rust and loose smut and produce large vitreous grain with good baking and milling properties. Most of them are suitable for macaroni making and some outyield other hard and soft wheat standards grown in their district. Slow progress made in introducing these varieties is criticized.

1878 Saprygina, E. S. & Kozjukina, N. I.
(**The importance of the place of origin of winter wheat varieties**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 14–17. [Russian].

At Dnepropetrovsk, the immediate and delayed effects of cold injury upon many varieties of wheat, including some from western and northern Europe, were investigated. Of the introduced varieties, some Swedish and Finnish forms gave a high percentage of survival in the spring, but only a Swedish and a few Finnish varieties showed complete recovery and were fertile. Similar aftereffects of cold injury were observed in some Soviet varieties originating from the Crimea.

1879 *Valle, O.
Kasvukausi 1951 Maatalouskoelaitoksen kasvinviljelysosaston kenttäkokeiden valossa. (**The crop season of 1951 in the light of experiments at the Crop Section of the Agricultural Research Institute**).
Koetoiminta ja Käytäntö 1951 : **8** : No. 12: p. 1.

The new winter wheat Jo. 02382 (Varma x Kehra) has proved hardier and yielded more grain than Varma, the variety most commonly

* An extended summary of this paper is on file at the Bureau.

grown in Finland. Jo. 02382 has stiff straw and makes good bread.
Results of trials of Finnish and other European varieties of spring wheat, oats, barley and turnip rape are also reported.

1880 WITTENROOD, H. G.
Kouderesistenties van een assortiment West-Europese tarwerassen, vergeleken met hun snelheid van ontwikkeling na de winter. (**Cold resistance of a collection of West European varieties of wheat compared with their rate of development after winter**).
Versl. Inst. Landb. Onderz., Wageningen 1951 : 148–49.

Tests of about 300 wheats indicated that, though cold resistance tended to be associated with slow development, and lack of resistance with rapid development, there was also a fairly large number of varieties combining good resistance with fast spring growth. This type of wheat comes mainly from the mountainous regions of Central Europe, e.g. Switzerland and Austria.

1881 POLLHAMER, E.
Kísérleti adatok egyes őszi búzafajták télállóságának vizsgálatáról 1950/51. évben. (**Some conclusions from experiments carried out in 1950-51 on the winter hardiness of certain autumn wheat varieties**).
Agrártudomány, Budapest 1951 : **3** : 618–24.

Field and laboratory investigations of Hungarian wheat varieties have shown that, in general, frost resistance and sugar content are inversely related.

1882 ESTEVES, I. A.
A anatomia do colmo de alguns trigos; sua possível relação com a acama. (**The stem anatomy of certain wheats; its possible relationship to lodging**).
Melhoramento 1952 : **5** : 21–49.

A review of the views of previous authors on the causes of lodging in cereals is followed by a report of anatomical studies of the stems of a number of varieties of *Triticum vulgare*. Close resemblances were observed between all varieties, the differences detected being mainly in the number of cell layers comprising the stereome, the size of these cells and the thickness of their cell walls.
Varieties with the largest number of cells and thickest walls are thought to have the greatest possibility of being resistant to lodging and are enumerated.

1883 LÉLLEY, J.
Újabb adatok a magyar búzafajták szalmaszilárdságáról, feketerozsda fogékonyságáról és lisztminőségváltozásáról. (**Further data on the strength of straw, susceptibility to black rust and changes in flour quality of Hungarian wheat varieties**).
Agrártudomány, Budapest 1951 : **3** : 611–16.

The varieties with the strongest straw were found to be Bánkút 1201 and 1205.
Varietal differences were noted in the changes in flour quality during maturation. In Bánkút 1201, flour quality improves until the moment of full ripening and thereafter deteriorates, while in F 481, flour quality does not begin to fall off until 6 days after full ripening.
All Hungarian wheats are susceptible to black rust. The later ripening varieties Székács 1055 and F 481 were however less susceptible than the earlier Bánkút lines. Mature plant resistance was not found in the varieties investigated.

1884 WILLIS, S. J.
Ergot in wheat variety trials in Hertfordshire.
Plant Path. 1953 : **2** : 34–35.

An inspection of 12 wheat varieties harvested in 1952 at Buntingford, England, revealed a higher incidence of ergot (*Claviceps purpurea*) in some varieties, notably Cappelle, Vilmorin 27, Holdfast and Nord Desprez, than in others such as Atle, Little Joss and Hybrid 46. Data from several other trial centres in Hertfordshire supported these observations.

1885 BABENKOV, I.
(**An experiment on seed growing at a collective farm**).
Kolhoznoe Proizvodstvo (Collective Farming) 1953 : No. 1 : 24–25. [Russian].

Trials of various cereals, including a new spring wheat, Lutescens 801, showing resistance to loose smut, and a millet, Kinelj 3221, which carries resistance to lodging, in the Kuĭbyšev province are mentioned.

1886 URRÍES, M. J. & CAÑAMÁS, R.
Razas fisiológicas de "*Puccinia graminis tritici*" y "*P. rubigo-vera tritici*" en España, en el período 1950–52. (**Physiological races of *P. graminis tritici* and *P. rubigo-vera tritici* in Spain in the period 1950-52**).
Bol. Inst. Invest. Agron., Madr. 1952 : **12** : 593–616.

In addition to those already mentioned (cf. *PBA*,

Vol. XXII, Abst. 1095) four further races of *P. graminis* var. *Tritici*, races 9, 19, 94 and 176, are reported. Khapli remained immune, most *Triticum durum* varieties were susceptible, and in *T. vulgare* Reliance continued to be immune or highly resistant. The cultures isolated from *Berberis hispanica* mostly corresponded to no established race and must be regarded as new races.

In determining the races of *P. rubigo-vera* var. *Tritici*, the reaction of the differential host Democrat was found to be unduly variable. Four new races have been established provisionally.

1887 Cañamás, R. & Urríes, M. J. de.
Reacción de una colección de trigos del Centro de Cerealicultura a las razas 14, 21 y 24 de *"Puccinia graminis tritici."* **(Reaction of a collection of wheats from the Centre for Cereal Cultivation to races 14, 21 and 24 of *P. graminis tritici*).**
Bol. Inst. Invest. Agron., Madr. 1952 : **12** : 573–88.

Seedling and mature plant reactions were observed in a number of varieties and hybrids, Spanish and introduced, after artificial infection with the three races. Certain varieties, such as Escondido, Carleton, Conti 83 and the hybrid 205–58, combined seedling and mature plant resistance to all three races; others possessed mature plant resistance only and a few were resistant only in the seedling stage.

1888 **New stem rust in California.**
Crops & Soils 1953 : **5** : No. 5 : p. 24.

Two wheats, White Federation 38 and Ramona 44, formerly resistant to all known races of stem rust, are both susceptible to a new race occurring near Davis, Calif.; Poso 48 and Baart 46 are, however, resistant.

1889 **Yellow rust of wheat in England and Wales, 1952.**
Plant Path. 1953 : **2** : 37–38.

Reference is made to research at the National Institute of Agricultural Botany on the relative prevalence of physiological races of *Puccinia glumarum*. Since 1949, only races 2, 5 and 8 have been found in the field; race 8 is very widespread but races 2 and 5 are confined to the northern and southern regions of England and Wales respectively.

1890 Wu, C. S. & Ausemus, E. R.
Inheritance of leaf rust reaction and other characters in a spring wheat cross.
Agron. J. 1953 : **45** : 43–48.

The inheritance of rust reaction and other characters was studied in the cross between the leaf rust resistant wheat Lee (Hope x Timstein) and susceptible Mida (Ceres-Double Cross x Ceres-Hope-Florence). The mature plant resistance of Lee to a collection of leaf rust races in the field was differentiated from the reaction of Mida by two pairs of independent genes, whose effect was additive; susceptibility appeared to be partially dominant. F_2 and F_2 segregations for mature plant reaction to stem rust could be explained on the basis of duplicate, independently inherited and dominant factors for resistance, each parent contributing one factor. The seedling resistance of Lee to race 126 of leaf rust in greenhouse tests depended upon a single recessive gene; its resistance to race 5 in the seedling stage was conditioned by a single dominant factor; the genes for resistance to these two races were linked with a recombination percentage of 21 $\pm$ 2·7. Duplicate, independently inherited and dominant factors were responsible for resistance to race 9, each parent carrying one dominant pair. The hairy auricle of Mida was completely dominant to the non-hairy auricle of Lee, and depended upon a single gene. Coleoptile colour was also governed by a single pair of genes, the brown coleoptile of Mida being dominant to the pale green one of Lee. Some indication was obtained of association between seedling reactions to individual races of leaf rust, and between these seedling reactions and the mature plant responses to a collection of leaf rust races. The factors of Lee for seedling resistance to leaf rust races 5, 9 and 126 and one of the two factors for mature plant resistance appeared to be associated.

1891 Watson, I. A. & Singh, D.
The future for rust resistant wheat in Australia.
J. Aust. Inst. Agric. Sci. 1952 : **18** : 190–97.

In the case of both stem and leaf rust in Australia, new races appear to have increased their range of pathogenicity in steps, each step corresponding to a mutation at a single locus in the fungus, and affecting the activity of a single gene in the host. At the University of Sydney, breeding therefore aims at incorporating pairs of genes for resistance into a basic genotype well-adapted to local conditions in New

South Wales, instead of using resistance dependent on only a single gene. Breeding is also being carried out to produce wheats possessing multiple resistance to both leaf and stem rust.

1892 Heyne, E. G. & Livers, R. W.
Monosomic analysis of leaf rust reaction, awnedness, winter injury and seed color in Pawnee wheat.
Agron. J. 1953 : **45** : 54–58.

Inheritance of the above characters was investigated in the F_1 and F_2 from crosses of 16 different monosomics of the spring wheat Chinese with the winter variety Pawnee; the leaf rust used was race 9. Pawnee has one dominant factor for seedling resistance to leaf rust, situated on chromosome X; this factor probably interacts with one from Chinese to give a dihybrid segregation.

The following hypothesis of awn inheritance is suggested. Pawnee, an awned wheat, has the recessive alleles *hd*, b_1 and b_2 on chromosomes VIII, IX and X, respectively. Chinese, with very short awns, possesses the two partially epistatic, awn-inhibiting alleles *Hd* and B_2; it resembles Pawnee in having b_1, which slightly suppresses awn development but less actively than its allele B_1. A series of *A* genes is proposed, incompletely dominant over their recessive alleles for awn production. Unless inhibited by *Hd* or B_2, *aa* results in full awn development. Chinese carries three *A* genes: A_3 (chromosome XII), A_4 (XVI) and A_5 (XXI); Pawnee has the corresponding recessives. The varieties both possess a_1 and a_2, situated on chromosomes II and XX, respectively.

Pawnee and Chinese have the same gene for red kernel, viz. R_1, on chromosome XVI, their genotype for kernel colour being $R_1R_1r_2r_2r_3r_3$. Genetical analysis of winter injury was not possible.

1893 Nastasi, V.
Considerazioni, ricerche e sperimentazione intorno alla coltivazione frumentaria in Eritrea. (**Notes, research and experimentation concerning wheat cultivation in Eritrea**).
Riv. Agric. Subtrop. 1952 : **46** : 273–80.

From a study of 72 varieties among the 134 wheats grown in Eritrea, four have been singled out as most suitable for areas between 2000 and 2350 m. altitudes; they comprise three varieties of *Triticum turgidum* and one of *T. durum*. Most imported wheats proved highly susceptible to *Puccinia triticina*, to which these four varieties have so far remained resistant.

1894 Voĭtčišin, N. V.
(New rust-resistant varieties of winter wheat for the north Caucasian foothills).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 10–14. [Russian].

The winter wheats Jubileĭnaja Osetii [Osetian Jubilee], Osetian 3 and Osetian 4, have recently been obtained at the North Osetian Breeding Station from a wide cross between two unspecified forms showing resistance to rusts. They carry resistance to lodging and immunity from various forms of rust and outyield other productive varieties in the northern Caucasus, including the standard Zemka and Skorospelka L–1 [Early L–1] and Kubanj 133, varieties developed in recent years at Krasnodar. The new wheats are adapted to combine harvesting and their baking properties are good. Osetian 3 is less susceptible to loose smut and more productive than the other two varieties.

1895 Pal, B. P.
Some contributions to superior germplasm in wheat.
Indian J. Genet. 1952 : **12** : 5–9.

Information is provided on the characteristics of 15 NP wheats of the 700 series, bred for the plains of northern India. Each of the varieties possesses some degree of field resistance to all three rusts occurring in the region.

1896 Silva, A. R. da
Melhoramento genético das plantas cultivadas para resistência às doenças parasitárias: principios fundamentais e sua aplicação aos trabalhos de melhoramento do trigo. (**Genetical breeding of cultivated plants for resistance to parasitic diseases: basic principles and their application to the work of wheat breeding**).
Agros, Rio Grande do Sul 1951 : **4** : 63–142.

After a review of published information on the subject a report is given of work carried out in Brazil. The established differential hosts were supplemented by Frontana for *Puccinia graminis* var. *Tritici* and by Frontana, Sinvalocho and Rio Negro for *P. rubigo-vera* var. *Tritici;* of the former, races 11, 15 and 17 proved to be present, but race 17 differed slightly from the North American race in its reactions, and its frequency has increased since 1940, probably owing to the cultivation of the variety Frontana which is susceptible to it. In *P. rubigo-vera* var. *Tritici* subraces were found in race 20; in addition to

this race, the most prevalent were 13, 31 and 77; two new races, RN1 and RN2, were also found.

The results of testing a large collection of wheats with races 11, 15 and 17 of *P. graminis* var. *Tritici* and race 20 of *P. rubigo-vera* var. *Tritici* are presented in tabular form, together with data for a smaller collection tested also with races 13, 31 and 77 of the latter rust. The variety Tremez Rijo of *Triticum durum* was resistant to all forms of both rusts, whereas no variety of *T. aestivum* resisted all races. Bagé and Sinvalocho were resistant to races 13, 20 and 31 and Rio Negro and several others to race 77 of *P. rubigo-vera* var. *Tritici*. A number of varieties are indicated as possessing resistance to the stem rust races in the seedling, and a few in the mature plant, stages. Frontana and Rio Negro possessed mature plant resistance to leaf rust.

For breeding purposes the varieties Red Egyptian, Kenya 58 and Timstein 3990 were used as stem-rust resistant parents, and Frontana, Rio Negro and Fronteira as parents adapted to Brazilian conditions. Data are presented regarding the number of plants selected from each cross, after natural infection in the field and artificial infection in the greenhouse; 85 lines proved homozygous for resistance to all three stem-rust biotypes, and of these 2 were classed as early, 16 as medium and the rest as late. Resistance to race 20 of leaf rust was found in 13 lines. The segregation for stem-rust reaction in F_3 families of Fronteira x Timstein indicated that resistance was determined by a single gene. No linkage was detectable between resistance to stem and leaf rusts, or between reaction to the three different races of stem rust; a strong positive correlation was established between resistance to race 15 and late maturity, whereas reactions to races 11 and 17 were independent of maturity time.

A number of varieties were tested for reaction to *Ustilago Tritici;* of the wheats commonly cultivated, only Planalto, Nordeste [Northeast] and Frontana proved resistant. In tests with *Tilletia foetida*, differences were observed in reaction according to the provenance of the inoculum but Negroz, Petiblanco, Nordeste and DP31 were resistant to all, and Bagé and Fronteira to all but one; Frontana, Rio Negro and Trintecinco [Thirty-five] were susceptible.

Some of the hybrids under observation appear to be equal to Frontana and Rio Negro in general characteristics, while also possessing resistance to stem rust races 11, 15, 17 and probably 42; they are unfortunately susceptible to leaf rust. Other hybrids are resistant to races 11 and 17 of stem rust and race 20 of leaf rust.

The importance of international cooperation in breeding for resistance to these pathogens is stressed.

1897 Den gula vetemyggan. (**The yellow wheat midge**).
Flygbl. Växtskyddsanst. 1952 : No. 98 : Pp. 4.

Contrary to previous opinion, varietal differences in the resistance of wheat to *Contarinia tritici* are attributable largely to characteristics such as the time and rate of ear emergence, which determine the severity of the attack. Varieties in which emergence is early and slow are most subject to damage, while those in which it is late and rapid suffer least. Some estimations from regional observations in Sweden on the degree of damage to the wheats Ergo, Thule II, Eroica and Skandia are recorded.

1898 Koehler, B., Bever, W. M. & Bonnett, O. T.
Soil-borne wheat mosaic.
Bull. Ill. Agric. Exp. Sta. 1952 : No. 556 : 567–99.

The bulletin includes data on the reactions of a large number of soft and hard winter wheat varieties to mosaic, and also a survey of selection and breeding for resistance to the virus in Illinois. A number of soft wheats with good resistance are suitable for growing in this state. The recently released soft wheat Saline (Illinois 2 x Gladden) is resistant (cf. *PBA*, Vol. XXII, Abst. 2630). Among hybrid selections exhibiting immunity is Illinois 38–686 [(Gladden x Illinois 2) F_1 x Gladden)]; this variety will not however be released for general use since it is susceptible to loose smut; the mosaic-immune selections are the result of transgressive segregation.

1899 Zweifel, J. & Keller, C.
Le froment de printemps Lichti. (**The spring wheat Lichti**).
Rev. Rom. Agric. 1952 : **8** : 93–95.

The performance in Switzerland of this wheat, bred in Germany and grown there since 1938 under the name Lichtis Weihenstephaner früh [Lichti's Weihenstephan Early], is recorded. A provisional botanical description is given (cf. Abst. 1788).

OATS

1900 Sappenfield, W. P.
The inheritance of earliness among six common varieties of *Avena*.
Diss. Absts. 1952 : **12** : Publ. No. 4284 : p. 766.

In crosses involving Mo. 0–200, Andrew, Clinton, Shelby, Ajax and Victory, earliness was determined by a series of multiple factors with a cumulative effect. Among crosses in which the difference in time of heading of the parents was great, earliness was incompletely dominant to lateness. In crosses whose parents differed less in this character, earliness appeared to be dominant to lateness; the similar or earlier date of heading of the F_1 plants in relation to the relatively early parent was attributed to heterosis and gene interaction. As the difference between two varieties in time of heading widened, the number of gene differences also increased. The two very early varieties, Mo. 0–200 and Andrew, apparently differed by at least two genes; Mo. 0–200 and the very late Victoria probably differed by a minimum of four. In most crosses, true breeding segregates equalling or exceeding the early parent in earliness were obtained.

1901 Stanton, T. R. & Coffman, F. A.
Winter oats for the south.
Fmrs' Bull. U.S. Dep. Agric. 1951 : No. 2037 : Pp. 19.

The bulletin includes a detailed discussion of old standard varieties of red oats and of many relatively new varieties of common and red oats, with particular reference to their disease resistance and winter hardiness.

1902 **Dubois, new winter oat, developed for Indiana growers.**
What's New Crops Soils 1953 : **5** : No. 5 : p. 25.

Outstanding resistance to lodging characterizes Dubois, recently developed at the Purdue Agricultural Experiment Station, Ind. The new oat also excels the locally grown Forkedeer in respect of yield, winter hardiness and grain colour.

1903 Osler, R. D. & Hayes, H. K.
Inheritance studies in oats with particular reference to the Santa Fe type of crown rust resistance.
Agron. J. 1953 : **45** : 49–53.

Inheritance of the Santa Fe type of crown rust resistance was studied in crosses with selections possessing the Canadian type of resistance to stem rust and the Bond type of crown rust resistance. The two selections used were derived from Bonda x Hajira-Joanette and Hajira-Joanette x Bond-Rainbow. In the F_3 and F_4, resistance to all 14 races of crown rust used depended upon three dominant and independently inherited factors, *C*, *D* and *S*. The genes *C* and *D* together, *S* alone, or a combination of all these factors conditioned resistance; the Santa Fe parent apparently carried *SS*, but its constitution in respect of the other two pairs could not be determined. Some indication was obtained that Santa Fe possesses, in the homozygous condition, one of the complementary factors for the Bond type of resistance. Selection for resistance to race 45 resulted in resistance to the other 13 races. Resistance to a mixture of stem rust races 7 and 8, inherited from Hajira-Joanette, was probably determined by a single factor pair. No association was detected between response to crown and stem rust; nor was any found between rust reactions and date of heading, number and length of basal hairs, percentage of lower florets with awns, awn strength or kernel plumpness.

1904 **Sauk oat is announced by Wisconsin Experiment Station.**
What's New Crops Soils 1953 : **5** : No. 6 : p. 30.

The desirable characteristics of Bond and Victoria have been combined in a new variety, Sauk, released for seed increase. Sauk matures at mid-season, is resistant to *Helminthosporium* blight and moderately resistant to stem rust, smut and leaf rust. Grain yields are high and the straw, which is shorter than that of Branch, stands well on fertile soils.

1905 Tuul, S. Ju.
(The oat Iygeva Hjamarik).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : p. 76. [Russian].

A new promising oat, Iygeva Hjamarik, was bred from Strube Schlanstedt x Kehra Tangu at the Iygev Breeding Station, Estonia. It shows a higher degree of resistance to rust than the standard Iygeva Agu and its grain quality is as good as that of the standard. It yields 32·9–43·9 c. per ha. The 1000 seed weight is 35·6–40·2 grm. and the chaff content is low. The new oat has a growth period of 95 days. It shows resistance to lodging.

1906 **Oat variety trials.**
Mon. Rep. Minist. Agric. N. Ire. 1953 : **27** : 299–300.

A summary is given of the main results of trials carried out from 1949 to 1951 in Scotland to

test varieties under conditions of good to high fertility and the poorer conditions of the hill districts.

RYE

1907 Lundqvist, A.
Inbreeding in autotetraploid rye.
Hereditas, Lund 1953 : **39** : 19–32.

An analysis was made of the effects of inbreeding for four generations upon plant height, number of spikelets and seed fertility in diploid and corresponding tetraploid populations. The reaction of both forms to inbreeding was similar for each character; plant height was least and seed fertility most affected. For all characters and generations, however, the tetraploids showed less inbreeding depression, the differences between $2n$ and $4n$ values often being highly significant. Data on the I_1 and I_2 generations from $2n$–$4n$ sectorial chimeras of the same variety reveal similar effects. The degrees of vitality of the different characters were positively correlated in each generation (I_1–I_4), the correlations being stronger in the tetraploid material. The curves indicated that the inbreeding depression was mainly associated with the chromosomes rather than with plasmatic conditions. The possible genetical basis of the tendency of the depression curves to be S-shaped, in both diploid and tetraploid populations, and especially in the case of spikelet number, is discussed.

1908 Nilsson, H.
Über die Entstehung der Selbstfertilität beim Roggen. (**On the origin of self fertility in rye**).
Hereditas, Lund 1953 : **39** : 65–74.

When 117 plants of Petkus rye were bagged, only two of them gave seed sets above 5%, and none above 10%; 22 plants were completely self sterile. Similar percentages were found in other rye varieties, including Russian land races and weed ryes; even in tetraploid Stål [Steel] no plant set more than 35%. The progenies of the selfed plants however showed in all cases a marked rise in fertility, some plants giving sets of over 50%. High self fertility proved, in crosses with self sterile plants, to be dominant and only 1 in 20 sterile plants appeared in the F_2. These results are interpreted on the basis of a series of allelomorphs causing inhibitory certation, comparable to those in *Nicotiana*, the effect of which is removed in some plants upon enforced self pollination.

1909 Honkavaara, T.
Rukiin kylvöajasta Etelä-Pohjanmaalla. (**Sowing time for rye in South Pohjanmaa**).
Koetoiminta ja Käytäntö 1952 : **9** : No. 7–8 : 1, 4.

The response of a few named varieties of rye to differences in time of sowing is mentioned incidentally in a general discussion of this subject.

1910 **Forage-producing strain of Abruzzi rye gives good yield.**
What's New Crops Soils 1953 : **5** : No. 4 : p. 23.

At the Mississippi State College a strain of Abruzzi rye has outyielded other forage grasses and shown a high rate of growth in autumn and winter. It is resistant to leaf rust and frost injury.

1911 Saloheimo, L.
Rukiin talvehtimistautien torjuntakokeet Tohmajärvellä vv. 1948–1950. (**Experiments on the prevention of overwintering diseases of rye at Tohmajärve in the years 1948-1950**).
Koetoiminta ja Käytäntö 1952 : **9** : No. 9–10 : p. 4.

An account is given of experiments conducted with a number of varieties of rye in connexion with control of attack by *Fusarium nivale* and *Sclerotinia borealis*, comparative data being included for winter survival and grain yield.

MAIZE

1912 Schmidt, J. W.
Thermal-neutron induced effects in F_1 maize plants.
Abstr. Doct. Diss. Univ. Neb. 1952 : 37–44.

The comparative effects of neutron radiation on pollen and seed as measured by subsequent growth of seedlings at Lincoln, Neb., are summarized (cf. *PBA*, Vol. XXII, Abst. 1131). Further analyses of phenotypical and cytogenetical responses in the mature F_1 derived from lines fertilized with irradiated pollen have made use of associations of certain plant characters with recessive genetic markers dependent on chromosomal deficiencies for their expression. Regression and correlation data provide evidence that the long arm of chromosome 1 has the greatest influence on favourable plant development, while in this respect, the short arm of chromosome 2 is the least important of the four arms studied.

1913 Demaret, Y.
Points essentiels de l'amélioration du maïs. (**Essential points in maize improvement**).
Bull. Inform. INEAC 1952 : **1** : 265–78.
The older and the newer methods of maize selection and breeding are explained with special reference to the value of building up synthetic hybrid populations, instead of crossing to obtain double hybrids, a method of no immediate interest to African cultivators in the Belgian Congo (cf. *PBA*, Vol. XXII, Abst. 2542). Details are also given of the technique that is being used in building up synthetic varieties and of the various stages in the maize improvement programme in progress at Yangambi.

1914 Bunting, E. S. & Blackman, G. E.
Hybrid maize as a grain crop. An assessment of the possibilities.
Agriculture, Lond. 1953 : **59** : 578–82.
American and Canadian hybrids are all too late to ripen their grain consistently in southern England (cf. *PBA*, Vol. XXII, Abst. 1137). A discussion is given of the difficulties of harvesting due to late ripening and other factors, of early sowing as a means of securing greater earliness, and of the production of commercial hybrid seed in Britain; ways in which some of the problems can be overcome by breeding are indicated.

1915 Cauderon, A., Lascols, X. & Touvin, H.
Comportement du maïs dans la région de Paris. (**Behaviour of maize in the Paris region**).
Bull. Tech. Ing. Serv. Agric. 1952 : 673–81.
Climate, density of planting and choice of varieties are discussed. The American hybrids, W 255, U 20 and W 240, bred in France, outyielded other American hybrids and point to the value of selecting lines from well-adapted French populations as future breeding material.

1916 Montanari, V.
La coltivazione dei mais ibridi nel compartimento agrario delle Venezie: risultati conseguiti e possibilità future. (**The cultivation of hybrid maize in the Venetian agricultural department: results obtained and future prospects**).
Agricoltura d. Venezie 1953 : **7** : 59–80.
Figures are given showing the yields of maize hybrids in different provinces of the Venetian zone of Italy in 1950 and 1952, where the hybrids excelled the local varieties in every case; yields of up to 108·05 quintals per hectare are reported for the hybrid Embro 155. Factors operating against their wider adoption are the grain quality, which is said to be less suitable for the local dish, *polenta*, greater susceptibility to corn borer, greater manurial requirements, and the exposure of the terminal grains. They are more resistant to drought and lodging and their cultivation is recommended.

1917 Marić, M. M.
[**Trials of the (heterotic) F_1 generation obtained by crossing some of our most extensively cultivated varieties of maize**].
God. Poljoprivredn. Fak. (Yearb. Agric. Fac.), Beograd 1952 : No. 4 : 339–62. [Serbian].
The heterotic effects observed in the F_1 of Vukovarski Zuban [Vukovar Dent] x Žuti Osmak [Yellow Osmak], Flajšmanov Zuban [Fleischmann Dent] x Rumski Zuban [Ruma Dent], Mastodont x Beli Bankut [White Bánkút], Šidski Zuban [Šid Dent] x Bánkút "Bajša" and Flajšmanov Zuban x Bankút "Basjša" are described. Hybrids from the first two crosses showed no heterosis in respect of the number of internodes, length of stem and 1000 kernel weight. All the hybrids developed more vigorous root systems than their parents when grown in water culture. The F_1 from artificial crosses showed a more marked improvement in the degree of fertility than the hybrids obtained by free pollination. This may be partly due to the best material having been picked for artificial crosses.

1918 **New white corn hybrid.**
What's New Crops Soils 1953 : **5** : No. 6 : p. 28.
Texas 15W, bred at the Texas Agricultural Experiment Station, has outyielded all other white maize hybrids available in 1950 and 1951. It is better adapted to the Blackland Prairie than to the more humid parts of the state.

1919 Brooks, J. S., Pass, H. & Smith, J. W.
Hybrid corn strains recommended for 1953.
Bull. Okla. Agric. Exp. Sta. 1953 : No. B–389 : Pp. 3.
Information is provided on yellow and white maize hybrids recommended for commercial growing in Oklahoma (cf. Abst. 1920).

1920 Pass, H., Brooks, J. S. & Smith, J. W.
Performance tests of corn varieties and hybrids 1952.
Misc. Publ. Okla. Agric. Exp. Sta. 1953 : No. MP–29 : Pp. 23.

Tabulated summaries are given of trials of hybrids and open-pollinated varieties of maize carried out in Oklahoma during 1952.

1921 York, J. O.
Recommended corn hybrids for Arkansas for 1953.
Arkans. Fm Res. 1952 : **1** : No. 4 : p. 4.

The main results of tests carried out in 1952 on maize hybrids are summarized, and on the basis of the data from these and previous trials hybrids are recommended for the different regions of Arkansas.

1922 York, J. O.
Corn performance tests, 1952.
Mimeogr. Ser. Ark. Agric. Exp. Sta. 1953 : No. 11 : Pp. 21. (Mimeographed).

Data are presented on the performance of maize hybrids at seven centres in Arkansas; hybrids showing particular adaptability to certain conditions are recommended for those areas.

1923 Hutchcroft, C. D. & Robinson, J. L.
The 1952 Iowa corn yield test.
Bull. Ia Agric. Exp. Sta. 1953 : No. P115 : 859–912.

The results of trials of 219 maize hybrids are summarized.

1924 Arvier, A. C.
Maize-growing in the South Burnett.
Qd Agric. J. 1952 : **75** : 275–87.

Descriptions of six hybrids recommended for the above district in Queensland are included.

1925 Bertin, C. & Rautou, S.
Expérimentation réalisée sur maïs-grain en 1951 dans les régions méridionales. (**Experimentation carried out on maize for grain in 1951 in the southern regions**).
Bull. Tech. Ing. Serv. Agric. 1952 : 683–90.

The performance of many American and other varieties of hybrid maize, tested in different parts of southern France, is shown in tables, with recommendations of some suitable for Languedoc.

1926 De Marzi, G.
Selva selvaggia dei mais ibridi. (**The medley of maize hybrids**).
G. Agric. Domen. 1953 : **43** : p. 82.

Based on the results of trials conducted in Italy during 1947–51, lists are given in which the hybrids tested are grouped according to (*a*) the length of their maturation period and (*b*) the regions to which they are adapted.

1927 Nuffer, M. G.
A study of a mutable allele of A_1 and certain related modifiers of mutation in maize.
Diss. Absts. 1952 : **12** : Publ. No. 4278 : p. 773.

An allele of A_1 has been discovered which in the presence of *Dt* is extremely mutable; its mutability is expressed by frequent endosperm dotting and a variegated plant type. It has been given the full designation of a^m —1: *Cache*; the allele is subsequently referred to as a^m. In the absence of *Dt*, the effects of *a* for dotting and a^m are indistinguishable. Increases in the dose of a^m cause a simple arithmetic increase in dot frequency. Increases in the dose of *Dt*, however, produce an apparently exponential increase in dot frequency. The allele a^m mutates at all stages of plant development, and the frequencies at the various stages do not differ markedly. When compared with *a* at its most mutable stage, a^m mutates 67 times as frequently. The gametic rate of mutation of a^m does not differ greatly from that of other genes. Three groups of mutant alleles were obtained from a^m: stable or unstable phenotypic mutants, and mutants for genic stability. The mutable component of the locus a^m was tentatively located with regard to one constituent of the compound allele A^b. At least two incompletely dominant genes altered the *Dt*-induced mutability of a^m; when combined they completely inhibited its mutability. Using a^m as a tester, *Dt* was found to mutate to *dt* with a frequency comparable to that for other loci.

1928 Mangelsdorf, P. C. & Oliver, D. L.
Whence came maize to Asia ?
Bot. Mus. Leafl. Harv. 1951 : **14** : 263–91.

The theory of Stonor and Anderson (cf. *PBA*, Vol. XXI, Abst. 1009) that maize existed in Assam in pre-Columbian times is criticized. The present Assamese maize varieties, though possessing various primitive or unusual traits, have their counterparts in America. The various ethnological arguments indicating ancient cultivation in Asia are regarded as lacking in cogency. The parallel hypothesis of trans-Pacific diffusion of cotton developed by Hutchinson, Silow and Stephens (cf. *PBA*, Vol. XVIII, p. 183) is also criticized.

1929 Mes, M. G.
On possible cultural methods of speeding up breeding experiments with maize. I. The influence of length of day, night temperature and vernalization on flowering.
S. Afr. J. Sci. 1953 : **49** : 221–24.

In experiments on Potchefstroom pearl maize at the University of Pretoria, night temperatures of 55°–70° F and day lengths of 8½–16 hours did not hasten sexual maturity. Under all treatments silking was delayed. This maize cannot therefore be classified as a short-day plant. Vernalization treatments ranging from 1 to 28 days at temperatures of 45°, 60°, 70° and 80° F had no significant effects upon the onset of flowering.

1930 Jones, D. F. & Mangelsdorf, P. C.
The production of hybrid corn seed without detasseling.
Bull. Conn. Agric. Exp. Sta. 1951 : No. 550 : Pp. 21.

Attempts to eliminate detasseling in hybrid maize seed production by the following means are discussed: (1) separation of selfed and crossed seed on the basis of specific gravity or endosperm colour, and (2) prevention of pollen production by chemicals, heat treatment, genetic male sterility or cytoplasmic male sterility. Experiments carried out at the Connecticut station on cytoplasmic male sterility are described. When this type of sterility is incorporated in inbreds, the degree of male sterility varies according to the source of the character and the genes for restoration of pollen production present in the inbred. Plants whose pollen is employed for the maintenance of the sterile line by back-crossing must be selected for the complete absence of pollen-restoring genes. A method of paired progeny selection is used, in which the individual supplying pollen for the back cross is self-fertilized and grown in proximity to the sterile progeny from a single back-crossed plant; if this back-crossed progeny is completely sterile and otherwise desirable, both the sterile progeny and its fertile counterpart are selected for further propagation. Three to four back crosses are adequate for converting an inbred into a sterile condition, without altering the line in other respects. To produce a sterile single cross, it is necessary to select the standard inbreds for parental sublines free from pollen-restoring genes, using the paired progeny method. Sterile single crosses intended as seed parents must be tested for maintenance of complete sterility under a wide range of environmental conditions. Restoration of pollen fertility in the final crop for grain can be accomplished in either of two ways: (1) mixing normal fertile seed with sterile seed, or (2) by incorporating pollen-restoring genes in one or both of the inbreds forming the original pollen parents. Preliminary results have indicated that cytoplasmic male sterility has no major effect upon other plant characters.

1931 Nelson, O. E. (Jun.), & Clary, G. B.
Genic control of semi-sterility in maize.
J. Hered. 1952 : **43** : 205–10.

A stock with defective endosperm (cf. *PBA*, Vol. XVII, Abst. 695) showed semisterility of both the ovule and pollen. Ovule semisterility was due to a lethal factor, designated lethal ovule$_2$ (*lo*$_2$). Pollen semisterility had its origin in a desynaptic condition in meiotic prophase, caused by a single recessive gene, termed desynaptic (*dy*). Neither factor affected the formation of the other type of gamete.

1932 Melhus, I. E.
Observations on the nutritive value of teosinte.
Science 1953 : **117** : 34–35.

Teosinte contains considerably greater amounts of nitrogen and methionine than maize. F_1 teosinte x maize hybrids have not differed significantly from maize in chemical composition; it is however expected that the F_2 progenies will show marked variation. It is suggested that the direct use of teosinte for food and the possible improvement of the protein content of maize by crossing with teosinte and subsequent selection for both yield and nutritive value require investigation.

1933 Van Reen, R. & Singleton, W. R.
Sucrose content in the stalks of maize inbreds.
Agron. J. 1952 : **44** : 610–14.

In five inbreds, Wf. 9, 38–11, T 1, Hy. and C 103, sucrose content increased to a maximum about three weeks after pollination, being highest in C 103. Translocation of carbohydrates to the ears occurred as the grain developed, and sucrose content decreased in the stalks of all varieties except C 103. Wf. 9 gave the highest grain yield and showed a maximum sucrose loss from the stalks. Differences in sucrose content during ear development are not, however, correlated with the amount of grain produced, since C 103 yields as much grain as 38–11, T 1,

and Hy. It is therefore assumed that genetic factors, as yet undetermined, are responsible for these variations between different inbreds. A good correlation between Brix reading and sucrose content was found within each inbred, but caution is needed in basing comparisons between inbreds on Brix readings, both when sucrose concentrations are low and when sugars are stored as hexoses rather than sucrose.

1934 Ševčuk, T. N.
(The Transcarpathian maizes).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 8 : 37–41. [Russian].

A recent collection of local forms and varieties in Transcarpathia made by the USSR Institute of Plant Industry is described. Some of the 31 samples studied have promising economic characters, including earliness and resistance to diseases.

1935 Neal, N. P.
Hybrid corn goes abroad!
What's New Crops Soils 1953 : **5** : No. 5 : 9–11.

A popular account is given of the recent development of locally adapted maize hybrids in many parts of Europe and the Middle East, subsequent to the postwar FAO scheme by which American hybrids and inbred lines were introduced to many countries, including those where maize was not previously grown.

1936 **Long-eared hybrids lead to larger corn yields, Indiana study indicates.**
What's New Crops Soils 1953 : **5** : No. 6 : p. 25.

Maize hybrids derived from inbred lines with long ears at Purdue University have yielded 13·9 bushels of grain per acre more than offspring of crosses between inbreds with short ears. Length of ear, rather than ear diameter or number of ears per stalk, had the greatest influence on yield increase. The average ear lengths of hybrids between long-eared lines and between short-eared lines were 9·56 and 7·5 ins. respectively.

1937 **(Make every effort to expand the sowing areas of highly productive standard varieties).**
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 3–6. [Russian].

Notes on the multiplication of some productive varieties of cereals, developed in recent years in the USSR, are given. Mention is made of some promising double crosses of maize obtained at the USSR Institute of Plant Industry. VIR* 42, VIR 25 and VIR 37, which have been made standards, carry resistance to lodging and fungous diseases and yield 7–10 c. per ha. more than other varieties and hybrids.

1938 **Husk turns away birds.**
What's New Crops Soils 1953 : **5** : No. 5 : p. 22.

Progress has been made at Ohio Agricultural Experiment Station in selecting inbred lines of maize which mature early and have long, tough husks which cannot be torn apart by birds (cf. Abst. 1177). It is hoped that agronomically desirable hybrids resistant to bird damage will be developed ultimately.

1939 Eden, W. G.
Effects of kernel characteristics and components of husk cover on rice weevil damage to corn.
J. Econ. Ent. 1952 : **45** : 1084–85.

A study of the maize hybrid US 13 showed that length of husk tip and number of leaves per husk were important characters contributing to the protection against rice weevil (*Sitophilus oryzae*) afforded by the husk. Their effects were independent of each other. From data on 20 varieties and hybrids it was found that kernel hardness influenced weevil resistance; for each increase of 1 lb. per sq. in. pressure required for kernel penetration, weevil damage decreased almost 1%. Husk cover was however a much more important factor than kernel hardness. No correlation was detected between pericarp thickness and weevil injury.

1940 Fleming, A. A.
Inheritance of characters in corn with special reference to the European corn borer.
Diss. Abstr. 1952 : **12** : Publ. No. 3086 : p. 121 : (Abst.).

At the University of Minnesota, a study was made of the F_1, F_2, and back cross progenies of A 357, a nontillering maize inbred characterized by soft rind, early maturity and susceptibility to corn borers, crossed with Fl. 235, a late maturing inbred with hard rind, good tillering capacity and borer resistance. Segregation data showed a highly significant correlation coefficient between resistance to overall damage caused by the first brood of borers and resistance to leaf feeding; two pairs of major genes are responsible

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for each type of resistance. Selection for resistance should not therefore be difficult, and it should be possible to increase the resistance of otherwise desirable lines by back-crossing. Early maturing plants showed a tendency to be more susceptible than later types, but overall damage was not associated with rind hardness or tillering.
Additional data provided evidence for a minimum of three pairs of major genes controlling rind hardness and at least four pairs determining date of maturity, while tillering appeared to depend on two pairs of factors.

1941 Horovitz, S., Marchioni, A. H., Fisher, H. G., Nico, R. A. & Sivori, E. M.
Informaciones experimentales complementarias sobre la resistencia a la langosta en el maíz. (**Supplementary experimental information on locust resistance in maize**).
Rev. Argent. Agron. 1952 : **19** : 208–13.

The fact that the gene *ag* for locust resistance is linked to *P* makes it possible to select resistant plants by selecting for pericarp colour. Locust-resistant lines are also resistant to the insect *Oiketicus kirbyi*, which can thus be used in selection. The Amargo maize used in Michigan for breeding maize resistant to corn borer has proved completely susceptible to locust when tested in Argentina.
Locust-resistant lines gave a positive reaction for phenols but a similar reaction was given by certain susceptible lines from the USA. No correlation between resistance and content of cyanoheterosides was detectable.

BARLEY

1942 Bain, R. & Martin, A.
Barley varieties in the North.
Scot. Agric. 1952–53 : **32** : 158–61.

The suitability of native and continental barleys for the northern parts of Scotland is discussed.

1943 Hsi, C. H.
The relationship of various agronomic and malting characters of barley as studied in ten crosses having Mars as a common parent and in two generations.
Diss. Abstr. 1952 : **12** : Publ. No. 3087 : p. 122. (Abst.).

Correlation coefficients and heritability estimates have been determined in the F_5 and F_6 of ten crosses involving Mars at the University of Minnesota. The high correlations between the F_5 and F_6 in respect of ear density, date of heading and diastatic capacity suggest that selection for these characters may be carried out effectively within lines in early generations. On the other hand, from the low correlations for other characters such as yielding ability, kernel weight, protein content and plant height, it appears that little gain can be achieved by selection within lines; selection for these characters is effective only on the basis of the progeny mean.

1944 **Custer barley is released to Nebraska growers for increase.**
What's New Crops Soils 1953 : **5** : No. 5 : p. 24.

Custer, a new spring barley developed at the Utah Agricultural Experiment Station in co-operation with the US Department of Agriculture, has outyielded other varieties undergoing field tests at Lincoln and North Platte, Neb. It resembles Velvon but matures 2–4 days earlier, has stiffer straw, and sheds its awns more readily during threshing. Like other recommended varieties in Nebraska, Custer is susceptible to loose smut and stem rust.

1945 Fröier, K.
Kornförädlingen vid Sveriges Utsädesförening. Uppnådda resultat och en utblick för framtiden. (**Barley breeding by the Swedish Seed Association. Results obtained and future prospects**).
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 401–14.

The speaker reviewed the available assortment of barleys and the advances and aims in barley breeding at the Association's various centres in Sweden (cf. *PBA*, Vol. XIX, Abst. 1790).
At the Upper Norrland Station, earliness is the main objective and promising lines have been obtained from combinations of Vega, Edda, Dore and early land barleys. About 20 mutants obtained from the early variety Dokkas are undergoing comparative trials. Several mutant lines are 9 days earlier than Edda I and yielded up to 20% more.
At the Jämtland Station, the breeding programme includes some X ray mutants of the variety Edda, which they equal in earliness and strength of straw, while surpassing it in yield. One such line, U 48/54, seems to be 4–5 days earlier than Edda.
At the Västernorrland Station the possibility of breeding early, 2-rowed barleys adapted to the district is under investigation. Mutant lines obtained by X irradiation include *erectoides* 16, from Maja, combining high yield and strength

of straw. It surpassed Edda by 8–9% in yield, but is nine days later.

At the Värmland Station, in breeding for earliness, yield and strength of straw, 600 lines from crosses between Asplund and various southern Swedish varieties and from Asplund crossed with selections from land barleys from northern Värmland are being studied. Finnish barleys, e.g. Tammi, and also X ray mutants, including *erectoides* 12 from Maja, combining earliness, strong straw and high productivity, are under investigation.

At the Ultuna Station, the aims are earliness and strength of straw and lines bred at Svalöf are being studied as well as selections from X ray mutants, which may be used in hybridization. High yielding lines with extremely strong straw, e.g. Ög 46/108d from the cross Maja x Drake at Östgöta, have been obtained. The line U 43/79 from a cross of Primus II and Svanhals [Swan Neck] has proved superior to Primus II.

The Västgöta Station is at present concerned mainly with trials of varieties and lines, including some X ray mutants from Bonus and some new mutations for stiffness of straw.

At the Östgöta Station breeding operations are being conducted with special reference to varietal suitability to different kinds of soil.

To meet the requirements of the southern region, served by the Kalmar Station, breeding operations are directed towards longer straw in combination with a good yield and also the production of winter barleys.

At Svalöf and the substations at Tagel and Uppåkna, breeding of 2-rowed fodder and malting barleys, of 6-rowed early types for southern and central Sweden, and of winter barley is in progress, as well as research on the practical and theoretical aspects of mutation. Mutant types are to be studied from the physiological and anatomical standpoints, special attention being given to the problems of the anatomy of the stem, and resistance to cold and drought.

1946 **(A hypotriploid barley).**
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 106–07. (Abst.). [Japanese].

Length of stem, tillering capacity and vegetative period are compared in diploid, autotetraploid and hypotriploid ($3n - 1$) lines of Soseigorudenmeron [Early Golden Melon] barley, the last-named being derived from crossing the first two. The meiotic metaphase chromosome configurations of the hypotriploid are described, the most common arrangements being $4_{III} + 3_{II} + 2_{I}$, $5_{III} + 2_{II} + 1_{I}$ and $3_{III} + 4_{II} + 3_{I}$, in descending order of frequency.

1947 Håkansson, A.
Endosperm formation after 2x, 4x crosses in certain cereals, especially in *Hordeum vulgare*.
Hereditas, Lund 1953 : **39** : 57–64.

As in rye and maize, the initial development of seeds from $2n$ x $4n$ and $4n$ x $2n$ crosses is good. The later disturbances are different in the two crosses, but their end result is the same, viz. degeneration of endosperm and embryo. The endosperm in $2n$ x $4n$ seeds attains large dimensions, but storage of starch is considerably retarded and only occurs in a small part of the tissue. A peculiar feature of such endosperm is the prolonged, though locally limited, mitotic activity causing outgrowths and ingrowths. The endosperm in $4n$ x $2n$ seeds is small, and the starch is stored at a very early stage; mitotic activity is weak and stops early. Usually in the cross $2n$ x $4n$, a normal plumule and primary root are not differentiated. The abnormalities in endosperm and embryo development of $2n$ x $4n$ and $4n$ x $2n$ seeds of barley, rye and maize are compared, according to the results obtained by the author and other investigators.

1948 Ono, T.
(Fertility of tetraploid barley).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 81–82. (Abst.). [Japanese].

Colchicine-induced strains derived from 19 Japanese varieties have been studied for percentage fertility and incidence of aneuploidy from the C_1 to C_5 generations. In general, fertility improved in each successive generation, reaching as high a value as 91·9% in the tetraploid strain of the variety Soseigoruden [Early Golden], the value for the diploid strain being 99·1%.

1949 Nybom, N., Gustafsson, Å & Ehrenberg, L.
On the injurious action of ionizing radiations in plants.
Bot. Notiser 1952 : 343–65.

The X ray sensitivity of presoaked germinating barley seeds was shown to be 6–7 times greater than that of dry dormant grains, suggesting some correlation between water content and sensitivity. Exposure to anesthetics, compounds containing the —SH group and temperatures deviating from those allowing optimum growth (20°–30° C), however, gave additional protection against the lethal and growth inhibiting effects of X rays; such protection is

considered to be a consequence of changes in the intracellular O_2 pressure. It is pointed out that the X ray sensitivity of germinating seeds is increased by increases in the external O_2 pressure, whereas in dormant seeds the corresponding effects are very slight.
Environmental factors had little influence on sensitivity to neutron radiation; dormant and germinating seeds proved almost equally affected.
The contrast between the indirect effect of X rays and the direct effect of fast neutrons is discussed, in connexion with the different ionization densities produced by both types of radiation in the tissues.

1950 TAKAHASHI, R.
(On the geographical differentiation of cultivated barley in respect of the disarticulation of the spikelets. I).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : p. 93. (Abst.). [Japanese].
Wild barleys in which the spikelets are shed have the genetic constitution $BtBtBt_1Bt_1$; cultivated barleys with nonshedding spikes may be either $BtBtbt_1bt_1$ or $btbtBt_1Bt_1$. Hybridization studies have shown that Japanese and Chinese cultivated varieties come into the former category, and Russian, Near Eastern and European varieties into the second.

1951 HAMILTON, D. G.
The approach method of barley hybridization.
Canad. J. Agric. Sci. 1953 : **33** : 98–100.
The general procedure of the approach method consists of enclosure of the male and emasculated female spikes in the same bag. Details are given of field and greenhouse techniques. Seed sets of 70–90% have been obtained regularly, with the minimum of effort.

1952 HAGBERG, A.
Heterozygosity in erectoides mutations in barley.
Hereditas, Lund 1953 : **39** : 161–78.
So far 14 different loci for the *erectoides* type of mutation have been detected; in some cases two or more of the mutations have occurred at the same locus. The segregation of several *erectoides* (*ert*) mutants has been studied; the ratios obtained for normal : mutant plants have been fairly close to 3 : 1, with a significant deficit in homozygous recessives. Of the seven combinations of mutant x mother line which have been extensively investigated, two have exhibited superdominance or overdominance for total plant weight, tillering and yield of grain per plant; one has shown a superdominant response for floret number per ear. In the case of vigour, the relations between the different genotypes in segregating material have apparently varied from year to year. Comparisons between monohybrid and dihybrid heterozygotes and normal genotypes has revealed that the mutant genes frequently have a cumulative effect, as shown by the analysis of ear density. The mutations have a pleiotropic effect upon the phenotype, expressing varying levels of dominance for different part-effects; for one effect a mutant allele may be recessive, but dominant for another; with regard to a third effect the normal allele may be superdominant. A mutant allele may thus have positive or negative part-effects upon the phenotype, and two alleles may in some cases be complementary to each other, resulting in monofactorial heterosis.

1953 PREECE, I. A.
The quality of cereals and their industrial uses.
Chem. & Ind. 1953 : 160–62.
Methods for assessing malting quality are reviewed. It is pointed out that Scandinavian barleys such as Kenia, Ymer and Carlsberg have a more variable chemical composition than Plumage Archer or Spratt Archer and are consequently less acceptable for malting in Britian. The problem of developing new hybrids combining the yielding ability and short straw of Scandinavian types with the grain quality of the Archer varieties is therefore receiving attention (cf. *PBA*, Vol. XXII, Abst. 392 and 2709).

1954 AYERS, A. D.
Germination and emergence of several varieties of barley in salinized soil cultures.
Agron. J. 1953 : **45** : 68–71.
Significant varietal differences in salt tolerance were shown in tests of germination and emergence in salinized soil cultures. Good tolerance at the early stages of growth does not however necessarily imply that the variety will also possess a high level of tolerance throughout its life cycle.

1955 GUSTAFSSON, Å.
The cooperation of genotypes in barley.
Hereditas, Lund 1953 : **39** : 1–18.
The barleys Golden, Maja and Bonus were studied with respect to their behaviour in mixed and pure sowings. The mixtures, each consisting of two varieties, were somewhat superior

to the pure sowings in the four characters considered, spike and kernel number, total kernel weight and 1000 kernel weight; but the superiority was not marked. The strains varied in their reaction to one another, Maja being the best combiner, and the behaviour of the mixtures was directly influenced by sowing density and manuring.

Investigations were also carried out on the yielding capacity of different genotypes involving two monofactorial mutations, *erectoides* (ert_{29}) and *viridis*, either singly or in combination. The experiments analysed (*a*) the productivity of individual genotypes in pure cultures and in monohybrid and dihybrid segregating populations, and (*b*) the yield of genotype mixtures. Concerning (*a*), the following conclusions were reached: (1) the *erectoides* homozygote (*aaBB*) was 20% inferior to the normal homozygote (*AABB*) in segregating progenies grown under conditions of normal density, but only 5–10% inferior in pure cultures; (2) *AaBB* was at least 3–4% below the normal homozygote; (3) the *erectoides* type heterozygous for the chlorophyll lethal mutation *viridis* (*aaBb*) was similar to *aaBB*, and possibly somewhat superior; (4) *AABb* was superior to *AABB* by 10% or more; and (5) the double heterozygote *AaBb* was slightly superior to all other genotypes in dihybrid segregation. In study (*b*) the offspring of *aaBb* showed pronounced genotypical cooperation, the mixture of 1 *AABB* : 2 *AbBB* : 1 *aaBB* producing about 7% more than *AABB* with full density of sowing; it was however inferior with sparse sowing. The offspring of *AABb* also showed genotypical cooperation when grown at full density, giving a yield equal to that of *AABB*. It is therefore concluded that a given mutant, although it might be expected to undergo extinction on account of its low productivity, may nevertheless survive if it enchances the fitness of individually superior genotypes and of the population as a whole. The general implications of such a phenomenon are discussed (cf. Abst. 5).

1956 Atkins, I. M.
New mildew-resistant barley to come from 1953 harvest.
Sth. Seedsman 1953 : **16** : No. 2 : 16, 57.

It is expected that Cordova, developed at Denton, Tex., from a cross between Wintex and Texan, two varieties now widely grown in central Texas and the Plains, will soon replace its parents in these areas. Since 1949, Cordova has outyielded both parents in numerous trials. It combines many desirable qualities from both parents, such as smooth awns, winter hardiness and resistance to lodging, shattering and some races of loose smut, but it shows a much higher degree of resistance to races of mildew prevalent in Texas than either parent.

1957 Levine, M. N. & Cherewick, W. J.
Studies on dwarf leaf rust of barley.
Tech. Bull. U.S. Dep. Agric. 1952 : No. 1056 : Pp. 17.

Barley varieties previously used as differentials for determining physiological specialization in *Puccinia Hordei* were inoculated with 357 isolates originating in the United States and Canada. Nine varieties were found to be critical for the identification of racial complexes. The bulletin provides a key for identifying all races so far described by investigators, and a standard condensed key for identifying racial complexes by means of the nine differentials. The latter key includes 52 ingredient races. Evidence was obtained suggesting that mutations in pathogenicity occurred under natural conditions and in the laboratory; the multiplicity of races is probably due to mutation.

1958 Borg, Å.
Angrepp av nematoder på havre. (**Attack of nematodes on oats**).
Växtskyddsnotiser, Stockh. 1952 : Nos. 5–6 : 69–74.

In this paper, dealing almost exclusively with oats, barley varieties are incidentally mentioned as differing in nematode resistance. The Swedish barleys Svanhals [Swan Neck] and Braga have proved markedly resistant.

1959 Løvø, P. J.
Forsøk med byggsorter på Statens Forsøksgard Voll og på gårdsfelter i Møre og Romsdal og i Trøndelag 1935–50. (**Trials with barley varieties at the National Experimental Station, Voll, and on local experimental plots in Møre and Romsdal and Trøndelag, 1935-50**).
Forskn. Fors. Landbr. 1952 : **3** : 171–208.

The detailed results of trials of Norwegian, Swedish and Danish varieties of 6-rowed and 2-rowed barleys are discussed, with reference to malting quality, yield, earliness, stiffness of straw and requirements as regards soil and temperature. The origin of the different varieties is given. The 2-rowed Domen (cf. Abst. 1200), Ymer and Maja are recommended where the soil is good and free from weeds. The most productive 6-rowed variety was Fræg

[Splendid] whose quality was satisfactory, but unfortunately it tends to lodge easily and is rather late.

1960 Hörberg, Y.
Weibulls original Herta- och Rikakorn. (Weibull's Herta and Rika barleys).
Weibulls Ill. Årsb. 1953 : **48** : 30–33.

The good performance of these two varieties (cf. *PBA*, Vol. XIX, Abst. 1791 and Vol. XXI, Abst. 1847 and 1848) in trials in different parts of Sweden and their resistance to lodging and high quality of grain are recorded.

MILLETS AND SORGHUMS

1961 Kramer, N. W.
Revolution in sorghums.
Sth. Seedsman 1953 : **16** : No. 1 : 13, 81, 84.

Recent research carried out at Lubbock and Chillicothe, Tex., in connexion with the production of hybrid grain sorghum is reviewed. In preliminary trials experimental hybrids have outyielded standard varieties by 60%, and some mature three weeks earlier than the earliest types now available.

1962 Kidd, H. J.
Haploid and triploid sorghum.
J. Hered. 1952 : **43** : 204, 225.

Cytological observations on a haploid and triploid are reported. Out of the 77 pollen mother cells observed in the former plant, 55 were haploid and 22 diploid. Chromosome configurations in the haploid cells were $8_{I} + 1_{II}$, $4_{I} + 2_{II}$ or $7_{I} + 1_{III}$. In the diploid cells the individual chromatids were more noticeable than usual, and stickiness was observed at anaphase I. The cytological behaviour of the other plant was typical of triploidy. The data from both forms suggest that sorghum is a good diploid species, although the occasional occurrence of bivalents in haploid cells and of tetravalents in diploid plants (cf. *PBA*, Vol. XVII, Abst. 219) are indicative of polyploidy.

1963 **Plant breeding method developed in South Dakota may speed process of getting new sorghum varieties.**
What's New Crops Soils 1953 : **5** : No. 4 : p. 24.

A preliminary report is made on the use of colchicine to produce homozygous lines, morphologically distinct from the parent strain but having the same number of chromosomes.

1964 **Okaw broomcorn released.**
What's New Crops Soils 1953 : **5** : No. 5 : p. 23.

The release of Okaw broom corn by the University of Illinois is reported. It has the advantage of resistance to stalk rot. The panicle stays green while being cured and can thus be dyed easily.

1965 Jakimenko, A. F.
(Maturation and harvesting of millet).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 55–60. [Russian].

Irregular maturity and shedding of Harjkov 436 and Veselyĭ Podol 367 are associated with uneven development of the different portions of the panicles. Breeding new varieties for uniform development of the panicle is advocated.

1966 Syed Vaheeduddin.
Two new physiological races of *Sphacelotheca sorghi*.
Indian Phytopath. 1951 : **3** : 162–64.

Collections of *S. Sorghi* infecting sorghum in Hyderabad were found to comprise 2 physiological races in addition to the 6 already recognized. A key for the identification of all the 8 races now known based on the reaction of the differential hosts is given.

RICE

1967 **Annual Report of the Director of Agriculture, British Guiana, for the year 1950** (1952) : Pp. 43.

An intensive programme of rice hybridization has been initiated. Among the older introductions, those from Venezuela and the United States are regarded as likely to be of value as parents. In its first trial on a field scale, the new variety D85/42 showed stiffer straw, less shattering, 14% higher yield and greater suitability for mechanical cultivation than the standard No. 79.

1968 Officiële opening van het vernieuwde proefstationsgebouw op 18 Januari 1952. **(Official opening of the newly reorganized experimental station building on 18 January, 1952).**
Meded. LandbProefst. Suriname 1952 : No. 13 : Pp. 27.

This communication, issued on the occasion of the official opening of the Surinam Research Station, after extensive improvements had been completed, contains: (1) an account by J. A.

van Beukering of the function and development of the station; and (2) F. W. Ostendorf's inaugural address dealing more fully with the new facilities and the general range of future research, which will include an extensive programme of rice breeding as well as work on the cultivation of *Cacao, Citrus* and other plantation crops.

1969 Richharia, R. H. & Saran, A. B.
Longevity of albino seedings in paddy.
Sci. & Cult. 1953 : **18** : 333–35.

In experiments on the behaviour of albino seedlings when grown in sand cultures, one type was observed which, otherwise albino, developed a green third leaf, after 35 days. Albino seedlings with the constitution w_1w_1, w_2w_2 or w_3w_3 (cf. *PBA*, Vol. XIV, Abst. 718) may be characterized, it is suggested, by a further genetic variation which is only expressed if the longevity of the seedlings is increased.

1970 Nishimura, Y. & Nakamura, M.
(Genetical studies on progenies of rice plants affected by atom bombing).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 72–73. (Abst.). [Japanese].

Data are provided on the degree of sterility, chromosome number and mutant characteristics of rice progenies grown from plants within the sphere of influence of the Nagasaki atomic explosion. The distance of the parent plants from the centre of the explosion is given.

1971 Tabata, H. & Kuriyama, H.
(Chromosome doubling in rice induced by colchicine).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 90–93. (Abst.). [Japanese].

Suitable techniques for inducing polyploidy in rice by means of colchicine are described, with notes on the morphology and fertility of tetraploid and mixoploid strains thus obtained from a series of Japanese varieties.

1972 Duong-Huu-Thoi
Biologie et croissance du riz dans le bassin du moyen-Niger. (**Biology and growth of rice in the basin of the middle-Niger**).
CR Prem. Conf. Internat. Africanistes Ouest 1950 : **1** : 434–36.

The rices grown in the mid-Niger basin have been found to belong mainly to the floating type and to be of African origin, viz. *Oryza glaberrima* or *O. africana*. A study of their growth rate and vigour has shown that a floating variety with an irregular growth curve will be liable to submersion, whereas rices showing curves most resembling those from *O. perennis* subsp. *Barthii* would be best suited to the inundations that often occur in the Niger basin.
Rice is a plant that readily lends itself to cultivation out of season, e.g. when sown later than usual. Early rices are less sensitive to such interference than the semiearly types. Varieties, such as Mamoriaka, with irregular growth curves were adversely affected by a deviation from the normal season for cultivation.

1973 Chandrasekharan, P.
The occurrence of barren tillers in a heterozygous rice.
Madras Agric. J. 1952 : **39** : 605–10.

A few plants of the apparently normal monosomic ($2n = 23$) type of the variety Muthusamba (cf. *PBA*, Vol. XIX, Abst. 994) produced barren tillers ($2n = 22$) in addition to fertile ones; the nullisomic tillers must have arisen as a result of somatic elimination of a chromosome.

1974 Ghose, R. L. M. & Butany, W. T.
Studies on the inheritance of some characters in rice (*Oryza sativa* L.).
Indian J. Genet. 1952 : **12** : 25–30.

Rudimentary auricle was recessive to normal and was monogenically inherited. In contrast to the results of previous investigators, the nonscented character was found to be dominant over scented in the single cross studied in this connexion. The character notched *vs.* unnotched kernel was determined by a single factor pair, *Nknk*; the expression of the notched condition was however affected by an inhibitor (*Ink*). The genes involved in the notched and unnotched characters segregated independently of scent and pericarp colour. A fleshy structure taking the place of the third style in two multipistillate types, together with the multipistillate condition, was inherited as a simple recessive to the normal single pistil.

1975 Calma, V. C. & Cuaresma, F. M.
A plot test of four selected strains of Seraup Kechil 36.
Philipp. Agric. 1951 : **35** : 329–32.

On the basis of grain yields obtained in field trials at the College of Agriculture, Laguna, Philippines, two selections of this lowland rice, designated 233 and 482, are recommended for commercial planting.

FORAGE GRASSES

1976 Bennett, H. W.
Plant breeders are developing better grasses.
Miss. Fm Res. 1952 : **15** : No. 4 : 1, 5.

Tall fescue. Selection for disease resistance and palatability is in progress.
Dallis grass. Hybridization of Dallis grass with a species of *Paspalum* immune from ergot has been achieved by controlling the temperature and humidity so that the two species flowered simultaneously; promising ergot resistant derivatives are now being selected for persistence and seed production.
Johnson grass. Selections with improved juiciness and carbohydrate content have been obtained from a cross between Johnson grass and the sorghum Hodo. In plant type the selections resemble either sorghum or Johnson grass.
Carpet grass. Upright and spreading disease resistant types of *Axonopus compressus* have been selected.

1977 Felföldy, L.
Természetes poliploid növények összehasonlító vizsgálata. II. Természetes poliploid füvek kémiai összetételérol. (**Comparative studies of natural polyploid plants. II. Chemical composition of natural polyploid grasses**).
Agrokém. és Talajtan 1951 : **1** : 181–88.

Chemical and histological characters have been studied in polyploid series involving Hungarian representatives of *Festuca pratensis*, *F. arundinacea*, *F. pseudovina*, *F. valesiaca*, *F. sulcata*, *Dactylis Aschersoniana*, *D. glomerata*, *Agrostis stolonifera* and *A. gigantea*.
A reduction in dry matter content with increase in chromosome number was only observed in the *F. pratensis* group. Nitrogen content appeared not to be related to degree of polyploidy. Some evidence was found for a rise in fibre content with increased chromosome number. In the *F. pratensis* group, tetraploid *F. pratensis* had the highest ash content, followed by the hexaploid *F. arundinacea*, but one sample of diploid *F. pratensis* came near to the maximum value, while the other came far below. A diminution in the content of Ca, Mg and K with rise in chromosome number was noted in the *F. pratensis* group but not in *Dactylis*.
The conclusion emerges that there is no straightforward connexion between chromosome number and chemical composition.

1978 Juhl, H.
An-euploidie und Systematik bei *Agrostis stolonifera* L. und *Festuca rubra L.* aus Schleswig-Holstein. (**Aneuploidy and systematic status in *A. stolonifera* L. and *F. rubra* L. from Schleswig-Holstein**).
Ber. dtsch. bot. Ges. 1952 : **65** : 330–37.

The majority of samples of different varieties of each of the above species from Schleswig-Holstein were found to be aneuploids, and no relation between chromosome number and taxonomic form or ecological locality of the plants could be observed. For *F. rubra* f. *multiflora* $2n = 64$ was recorded, a higher chromosome number than hitherto known.
As several varieties of *A. stolonifera* proved to be hexaploid, the writer suggests that f. *gigantea*, which is also hexaploid, should not retain its separate botanical status on the basis of its different habit alone.
Hexaploidy in *A. stolonifera* is probably of polyphyletic origin, since it is known to occur in the three different types, *prorepens*, *coarctata* and *gigantea*.

1979 Gerdes, G.
Untersuchungen über das absolute Gewicht (Tausendkorngewicht) der wichtigsten Futtergräserarten und ihrer Sorten im Hinblick auf die Leistungen der Gräserzüchtung. (**Investigations on the thousand seed weight of the most important species of forage grasses and their varieties in connexion with results of grass breeding**).
Züchter 1952 : **22** : 353–66.

In *Phleum pratense* the Finnish and Scandinavian varieties had the highest seed weights and the Welsh and USA varieties the lowest; in general, late forms had smaller seeds than early forms. In *Lolium perenne* the tetraploid showed the highest values; among the diploids, the early varieties again had larger seeds than late, leafy types; no clear differences could be established between different forms of *L. multiflorum*. Meadow types of *Festuca pratense* had heavier seeds than pasture types; in *F. rubra* the creeping forms had higher seed weights than the tufted forms. The Aberystwyth varieties S26 and S143 of *Dactylis glomerata* and the Swedish variety Brage had the highest seed weights; early flowering strains had higher values than late flowering. The largest seeds in *Poa pratensis* were in the Swedish and Finnish varieties, the smallest in varieties from Canada and the USA. The largest seeds in *Phalaris arundinacea* were

found in the varieties Motterwitzer and Steinacher; *Arrhenatherum elatius* varied greatly in consequence of the uneven ripening in this species. In *Bromus inermis* the North American varieties had the lowest seed weights.
The general conclusions from the observations are that early flowering forms such as those from the Scandinavian countries tend to have larger seeds than late flowering, leafy forms. Hay and pasture types each have their own range of variation.

1980 Kumar, L. S. S.
Breeding of forage plants.
Indian J. Genet. 1952 : **12** : 1–4.
A brief survey is given of the introduction of forage grasses and legumes and of selection of indigenous and introduced species in India. Future developments in the improvement of forage crops are discussed.

1981 Åkerberg, E. & Bingefors, S.
Progeny studies in the hybrid *Poa pratensis* x *Poa alpina*.
Hereditas, Lund 1953 : **39** : 125–36.
Studies have been carried out on the morphological characters, embryology and chromosome numbers of F_2 to F_4 derivatives of crosses between apomictic or sexual *P. pratensis* and apomictic *P. alpina* (cf. *PBA*, Vol. XII, Abst. 1086). The genetic development of apomixis in *Poa* is regarded as showing the same phases as *Parthenium* (cf. *PBA*, Vol. XVI, Abst. 419). The F_1 of the cross between aposporous, pseudogamous *P. pratensis* and diplosporous, pseudogamous *P. alpina* was mainly sexual. F_3 and F_4 data indicated that seed formation in the F_2 occurred as the result of fertilization of reduced egg cells, fertilization of unreduced egg cells, apospory followed by parthenogenesis, haploparthenogenesis or male parthenogenesis. F_2 and F_3 families from the cross sexual *P. pratensis* x apomictic *P. alpina* showed a very considerable segregation. Two of the F_3 families appeared to have developed from F_2 plants which resulted from fertilization of unreduced egg cells. Possibly gamete lethality provided an increased opportunity for apospory; the mother plant of *P. pratensis* has also shown a tendency towards apospory. The results are discussed in relation to natural hybridization between the two species and the possible origin of the complex chromosomal constitution of *P. pratensis*.

1982 Nygren, A.
How to breed Kentucky bluegrass, *Poa pratensis* L.
Hereditas, Lund 1953 : **39** : 51–56.
Procedures for breeding the aposporous species *P. pratensis* are discussed, mainly with reference to work at the Carnegie Institution, Stanford, Calif. In interspecific hybridization it is possible to raise several sexual generations, from which selections can be obtained and subsequently reproduced apomictically. The problem of too low a degree of apomixis in valuable types may arise; in such circumstances the segregating selection can be crossed with another form possessing a strong tendency to apospory. *P. pratensis* does not develop any endosperm without fertilization of the central nucleus. Hybridization should be planned on the basis of embryological investigation of the mother strain of *P. pratensis*. The embryological behaviour and thus also the success of hybridization have varied according to the climatic conditions. Clones should be developed from the hybrid segregates, and then planted in different localities, or tested under controlled room conditions corresponding to the climates in the planned areas of cultivation.

1983 Hanson, A. A. & Hill, H. D.
The meiotic behavior of hexaploid orchard grass (*Dactylis glomerata* L.).
Bull. Torrey Bot. Cl. 1953 : **80** : 113–22.
Meiosis in hexaploids of cocksfoot is described and compared with that in tetraploids carrying a reciprocal translocation, and also with the meiotic behaviour previously observed in open-pollinated and inbred tetraploids (cf. *PBA*, Vol. XIV, Absts. 217, 553). Correlation coefficients for meiotic irregularities in the hexaploids showed that the pattern of irregularity was similar to that in the tetraploids, particularly in inbreds with a high frequency of abnormalities. It is suggested that precocious disjunction is a factor influencing meiotic regularity. The frequency of aneuploids in the individual open-pollinated hexaploid progenies varied from 0 to 33·3%; their origin is discussed.

1984 Graham, J. H.
Purple leafspot of orchard grass.
Phytopathology 1952 : **42** : 653–56.
Preliminary data indicate that a high degree of resistance to purple leafspot (*Stagonospora maculata*) in cocksfoot can be obtained by selection.

1985 Swallen, J. R.
A new species of *Agrostis* from California.
Leafl. West Bot. 1949 : **5** : p. 198.
The new species *A. Hooveri* was collected on dry sandy soil in an open oak wood in San Luis Obispo Co. It is related to *A. Howellii* from which it differs in its finer foliage.

1986 Murphy, R. P. & Atwood, S. S.
The use of I_1 families in breeding smooth bromegrass.
Agron. J. 1953 : **45** : 24–28.

The results of experiments with spaced plants at Cornell University, Ithaca, NY, indicate that tests of I_1 families are valuable for three purposes: (1) progeny tests of selected clones; (2) selection of superior new clones; and (3) as sources of I_1 selfed lines which are relatively uniform, vigorous and disease resistant, and which should prove suitable for the production of synthetics. In most cases observations on a row basis were adequate for selection. The practical use of superior I_1 selfed lines alone or in synthetic combinations is discussed.

1987 Knobloch, I. W.
Tetraploid smooth bromegrass.
Bull. Torrey Bot. Cl. 1953 : **80** : 131–35.

Two plants of *Bromus inermis* were found to be tetraploid ($2n = 28$). Pairing was regular, suggesting that the plants were allotetraploids. Their possible origin is discussed.

1988 Wilsie, C. P., Ching, C. B. & Hawk, V. B.
Self-fertility and progeny performance in *Bromus inermis*.
Agron. J. 1952 : **44** : 605–09.

A wide range of self fertility was observed at Ames, Ia., among local selections and northern and southern types. Using cloth or parchment bags to isolate panicles of plants not previously inbred, *ca.* 20% of all plants proved self sterile and the average percentage of selfed seed was 12% of the seed set by open pollination. Continued inbreeding by selfing a number of selected lines effectively increased the production of selfed seed, from an average of 9·9 seeds per panicle in the S_0 to 12·4 in the S_2 and 23·4 in the S_4 generation. Self and cross fertility, as measured by open-pollinated seed, showed a positive correlation ($r = +0{\cdot}52$), but little or no correlation was found between self fertility and general combining ability. Seed set by open pollination gave a more reliable estimate of cross fertility than seed set resulting from diallel single crosses effected by bagging paired plants in the field.

1989 Gelin, O. & Wirén, G.
Engelskt rajgräs Weibulls Viris. Ny förädling. (**Weibull's perennial ryegrass Viris. A new production**).
Weibulls Ill. Årsb. 1953 : **48** : p. 34.

During the severe winters of 1940–42, a few plants of a Danish strain of ryegrass E.Fr.49 survived at Weibullsholm and were used as the basis for breeding the variety Viris. It is characterized by abundant foliage, late heading, rapid aftergrowth, freedom from disease, hardiness and persistence. In 6 years' trials it outyielded Sv. Viktoria on the average by 8% and it is suitable for both pastures and meadows and can be used in mixtures.

1990 De Roo, R.
Een dubbel steriele variant in tetraploid materiaal van *Lolium perenne*. (**A doubly sterile variant in tetraploid material of *L. perenne***).
Med. LandbHogesch. Gent 1952 : **17** : 554–63.

Following colchicine treatment, the male and female sterile autotetraploid, here described and illustrated, was obtained. The sterility may, it is suggested, be due not only to genetic causes but also to disturbances in the relationship between genome and cytoplasm. That it might, however, be due to duplication of a sterility gene is mentioned.

1991 Waterhouse, W. L.
Australian rust studies. VIII. *Puccinia graminis Lolii*, an undescribed rust of *Lolium* spp. and other grasses in Australia.
Proc. Linn. Soc. N.S.W. 1951 : **76** : 57–64.

The above name is proposed for a new subspecies of *P. graminis*, first discovered on *Lolium* spp. and subsequently found on some 30 grasses throughout Australia and New Zealand. Within each species there are both susceptible and resistant individuals. Results of inoculation tests suggest that it should be possible to breed a strain of *L. perenne* combining resistance to *P. coronata* subsp. *Lolii* and the new rust. There is evidence that several physiological races of the latter exist.

1992 Hanson, A. A. & Hill, H. D.
The occurrence of aneuploidy in *Phalaris* spp.
Bull. Torrey Bot. Cl. 1953 : **80** : 16–20.

Meiotic analyses of North American collections of four 28-chromosome species, *Ph. minor*, *Ph. arundinacea*, *Ph. californica* and *Ph. tuberosa*, have shown that all species are allotetraploids. Approximately 3% of the samples of *Ph. minor* had 29 chromosomes and 9% of the *Ph. arundinacea* plants were also aneuploids ($2n = 27$, 29, 30, 31 or 35). These variations in chromosome complement may have resulted from the observed failure, in some configurations, of orientation of one or more bivalents at meta-

phase I; the resulting univalents lagged in subsequent phases and led to the formation of unequal gametes. It is, however, assumed that the 35-chromosome plants were formed by nonreduction and hybridization between the resulting hexaploid and normal tetraploids, giving rise to a wide range of chromosome numbers.

1993 Morrison, S. H.
Perennial sorghum, a new forage crop for farms in southern U.S.
What's New Crops Soils 1953 : **5** : No. 5 : p. 20.

Sorghum almum, a natural hybrid of Johnson grass and Sudan grass developed by selection in Argentina (cf. *PBA*, Vol. XIV, Abst. 896), has shown promise as a forage crop at Athens, Ga., since 1949. It has inherited the perennial habit of Johnson grass, without undue spreading by underground rhizomes, and grows as vigorously as Sudan grass, producing tall, luxuriant foliage with no higher HCN content than annual types.

1994 Chessmore, R. A.
An evaluation of some field plot techniques for testing forage grasses.
Abstr. Doct. Diss. Univ. Neb. 1952 : 15–20.

Data from tests carried out at Perkins, Okla., on varieties of *Panicum virgatum* and *Bouteloua curtipendula* indicate that seed yields can be measured most efficiently in plots having 2 ft. blocked rows; maximum yields were obtained at this spacing. Forage yields were estimated equally well in 2 ft. blocked rows or 1 ft. drilled rows; the latter, however, yielded more hay of finer quality than the wider rows and are therefore recommended.

1995 Connor, H. E. & Cook, A. B.
Note on the breeding system of *Dichelachne crinita* (Linn.f.) Hook.f. in New Zealand.
N.Z. J. Sci. Tech. 1952 : **34** : 369–71.

Since inbreeding for two generations produced no depression in vigour or other deleterious effects, it is concluded that the species is facultatively self-fertilizing.

1996 Parkey, W.
Certain aspects of embryo culture and progeny evaluation in buffalograss.
Abstr. Doct. Diss. Univ. Neb. 1952 : 32–36.

Following crosses between clones with desirable characters at Lincoln, Neb., embryos were excised to remove them from the influence of growth inhibitors responsible for the lengthy period of seed dormancy characteristic of this species. On artificial media, the axes of embryos excised 13, 16 and 19 days after pollination developed successfully; those excised 19 days after pollination showed the highest percentage seedling survival. The percentage of seedlings obtained from the excised axes plus scutellum closely approximated that obtained from axes excised 16 days after pollination. By avoiding periods of dormancy, large numbers of progenies were evaluated in both field and greenhouse within two years, and superior selections were made much sooner than usual after hybridization.

1997 Rusanov, F. N.
(New methods of plant introduction).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1950 : No. 7 : 27–36. [Russian].

Promising material introduced in recent years into Uzbekistan includes several *Bouteloua* species. The method of introduction based on Mayr's theory of analogous climates is rejected. The new principle involves introduction, training and selection of plants from a wide range of geographical zones.

1998 Heinrichs, D. H.
Methods of breeding intermediate wheatgrass, *Agropyron intermedium* (Host.) Beauv.
Diss Abstr. 1952 : **12** : Publ. No. 3649 : p. 237. (Abst.).

In a study of seed setting ability, all clones proved to be self sterile. Both clonal lines and seed progenies showed highly significant differences in hay yield and 18 other characters. Associations between the clones and their progenies were greater for morphological characters than for yield and vigour. Yield was significantly correlated with vigour and plant density. Correlations between protein content and morphological characters were not sufficiently high to be of value in selection. Polycross progenies gave a better indication of general combining ability of parent clones than open-pollinated progenies.

1999 Vilkomerson, H.
The unusual meiotic behavior of *Elymus Wiegandii*.
Exp. Cell Res. 1950 : **1** : 534–42.

Meiotic abnormalities observed during microsporogenesis include the following: separation of pycnotic chromatin from the nucleus at early

prophase; formation of terminal and subterminal neocentromeres on some chromosomes at metaphase and subsequent stretching of the latter to produce unusual anaphasic configurations; irregular distribution of sticky substances; and the appearance of ringed fragments as micronuclei.

LEGUMINOUS FORAGE PLANTS

2000 McKenzie, R. E., Heinrichs, D. H. & Anderson, L. J.
Hay and crude protein yields, winter hardiness and wilt resistance of alfalfa varieties.
Sci. Agric. 1952 : **32** : 626–33.

A report is given of the results of two variety trials conducted at Swift Current, Sask., one on irrigated land and the other without irrigation. Ladak was concluded to be the most suitable variety for both irrigated and nonirrigated conditions in southwestern Saskatchewan. Rhizoma had the highest protein content in both tests, suggesting that this character is genetically determined and that the production of strains with high or low protein content should be possible by breeding.

2001 Resultat av 25-årigt förädlingsarbete. (**Result of 25 years' breeding work**).
Tidskr. Lantm., Helsinki, 1953 : **35** : p. 9.

After 25 years' work at the Plant Breeding Division of the Agricultural Research Institute of Finland, a blue lucerne strain, suitable for certain soils in southern Finland, has been released. As seed production of blue lucerne is not very successful in Finland, arrangements are being made to produce the seed in France.

2002 Matlock, R. S.
An evaluation of synthetic varieties of alfalfa in successive generations with respect to various agronomic characters.
Abstr. Doct. Diss. Univ. Neb. 1952 : 26–31.

Results of analyses of agronomic characters, including self fertility, forage and seed yields, recovery after cutting, cold tolerance and resistance to bacterial wilt, indicate that the third generation of each of six lucerne synthetics grown at Lincoln, Neb., gives a performance equal to that of the syn-1. Self fertility percentages expressed on the basis of the number of pods formed per 100 tripped flowers proved as reliable as those depending on laborious counts of the number of seeds per pod.

2003 Graumann, H. O. & Staker, E. V.
New alfalfas show promise.
Neb. Exp. Sta. Quart. 1952 : **1** : No. 2 : 10–11.

Promising synthetic varieties of lucerne have been developed at the Nebraska Experiment Station. Protein and carotene contents have shown a strong association in an analysis of 12 selections. Association between dark green colour and carotene content was less marked. Percentage of leaves in the total forage ranged from 38 to 45%. All 12 selections had higher contents of carotene and protein than Ranger.

2004 Staker, E. V. & Crandall, B. H.
Comparison of the carotene and nitrogen contents of alfalfa forage from selected clonal lines.
Agron. J. 1953 : **45** : 66–68.

No significant clonal differences in carotene content were detected, but the clones showed significant differences in nitrogen content. A significant correlation of 0·67 between nitrogen and carotene contents for clone means and a highly significant correlation of 0·72 between random variation in carotene and nitrogen contents were obtained. With the possible exception of wilt resistance, agronomic characters were not related to either the nitrogen or carotene content. Clones with Turkestan strains in their maternal pedigrees were higher in wilt resistance and lower in nitrogen and carotene contents than clones originating from variegated lucernes. It is suggested that breeding for increased carotene content might concurrently improve nitrogen content.

2005 Pedersen, M. W.
Nectar production in alfalfa clones as related to bee visitation and seed production including a study of techniques for measuring nectar.
Diss. Abstr. 1952 : **12** : Publ. No. 3639 : 239–40. (Abst.).

Centrifuging in volumetric tubes was a satisfactory method of nectar extraction in the case of sugar concentrations below 55%; with higher concentrations determinations by weight are recommended. Using field grown plants and cage conditions, 77% of the variation in seed production from plant to plant was associated with variation in numbers of nectar-collecting honey bees visiting the flowers; without a cage 39% of the variation could be attributed to the same cause.

Nectar sugar production ranged from 0·34 to 1·04 mg. per flower. Nectar production was a

highly heritable character, as indicated by a parent progeny correlation of +0·833**, and probably had a monofactorial basis.

2006 **Now bees may be on "job-wanted" list.**
Sth. Seedsman 1953 : **16** : No. 3 : p. 79.
A machine for effecting cross pollination of lucerne in the field is described.

2007 Pharis, R. L. & Unrau, J.
Seed setting of alfalfa flowers tripped by bees and mechanical means.
Canad. J. Agric. Sci. 1953 : **33** : 74–83.
A tripping machine was found to be ineffective in increasing seed yield of lucerne. Of the automatically tripped flowers only a small proportion formed seed; seed number per pod was similar to that obtained by selfing. Bumble and leaf-cutter bees were responsible for natural and cross pollination; honey bees were ineffective as trippers and pollinators.

2008 **Vernal alfalfa is to be available late in 1956; seed supplies being increased.**
What's New Crops Soils 1953 : **5** : No. 6 : p. 28.
Vernal lucerne, released for seed increase by the Wisconsin and Utah Agricultural Experiment Stations, possesses greater winter hardiness and resistance to bacterial wilt than Ranger, and has consequently given higher forage yields than the latter at trial centres in Wisconsin during the last three years. As Vernal has finer stems and darker leaves than Ranger, the hay is of superior quality.

2009 **That's Nomad alfalfa.**
Seed World 1952 : **71** : No. 11 : 8–10.
The chief advantages of the lucerne Nomad are its drought resistance, persistence and tolerance of grazing (cf. Abst. 1262). Its creeping habit shows considerable variability. Nomad was selected from a type which was found growing on an Oregon farm and which probably originated from Turkestan.

2010 Battle, W. R.
The effect of advance in generation and age of stand on bacterial wilt reaction of Atlantic alfalfa.
Agron. J. 1952 : **44** : 602–05.
A comparison of the wilt resistance of four generations of Atlantic lucerne grown in different parts of the USA has failed to reveal any marked changes which could be attributed to advance in generation or the influence of an environment other than that of the primary area of adaptation of the original strain. In aging stands of any generation grown at the New Jersey Agricultural Experiment Station, however, natural selection produces a progressive increase in wilt resistance after the sixth year, as susceptible plants are eliminated and only the very resistant individuals survive.

2011 Røed, H. & Støen, M.
Kløverråte og kløverål, to aktuelle kløversjukdommer. (**Clover stem rot and clover eelworm, two clover diseases of immediate importance**).
Norsk. Landbr. 1953 : **19** : 82–86.
Danish and Swedish strains of clover, resistant to both *Sclerotinia Trifoliorum* and *Ditylenchus dipsaci*, when tested in Norway seemed to be insufficiently winter hardy for the climate, and research on the production of resistant strains has now begun at the Institute for Genetics and Plant Breeding at the Agricultural College.

2012 Rankamaa, A.
Puna-apilan viljelystä Lapin läänissä. (**Cultivation of red clover in the province of Lapland**).
Koetoiminta ja Käytäntö 1952 : **9** : No. 5 : 3–4.
Included in an account of various aspects of red clover cultivation in Lapland are data of experiments performed between 1940 and 1950 with a considerable number of varieties, comparative hay yields in kg./ha. being given in each case.

2013 Dessureaux, L.
Variabilité des populations non sélectionnées de trèfle blanc Ladino. (**Variability of populations of Ladino white clover that have not been subjected to artificial selection**).
Agriculture, Montréal 1949 : **6** : 127–31.
Variation in vegetative characters and growth rate has been studied in samples of Ladino and white clover from various sources and in an F_2 segregate of Ladino x white clover at the research station at Sainte-Anne-de-la-Pocatière. The experiments indicated that Ladino clover comprises a considerable range of variants which should prove useful for breeding. The superiority at Sainte-Anne of the local strain of Ladino clover was evident.

2014 Knight, W. E.
Breeding Ladino clover for persistence.
Agron. J. 1953 : **45** : 28–31.
Tests of F_1 progenies of selected clones of Ladino clover (*Trifolium repens*) at Pennsylvania State College have shown that persistence is a heritable

character. Differences in specific combining ability for vigour were detected. Polycross tests suggested that this method would be suitable for the isolation of clones with good general combining ability.

2015 Hanson, A. A., Graham, J. H. & Kreitlow, K. W.
The isolation of Ladino clover plants resistant to *Sclerotinia trifoliorum*.
Canad. J. Agric. Sci. 1953 : **33** : 84–90.

Repeated clonal testing by artificial inoculation in the greenhouse proved to be an effective method of isolating plants with some degree of resistance to *Sclerotinia* crown rot in experiments in the United States; this technique may not however be the most efficient approach. One cause of variation in survival was disparity in vigour. In the F_1 progeny tests, the average percentage of healthy survivors from the resistant x susceptible crosses was approximately midway between the percentages from the resistant x resistant and susceptible x susceptible progenies. The degree of resistance in the resistant x resistant offspring varied according to the parents. Resistance is apparently governed by several genetic factors.

2016 **Find white "crimson clover".**
What's New Crops Soils 1953 : **5** : No. 6 : p. 26.

Investigations are in progress to determine whether a crimson clover plant with white flowers, which arose at the Arkansas Agricultural Experiment Station, has any value for breeding purposes.

2017 Crider, F. J.
Natob—a new bush lespedeza for soil conservation.
Circ. U.S. Dep. Agric. 1952 : No. 900 : Pp. 10.

A detailed account of the hardy lespedeza Natob (*Lespedeza bicolor*) is given (cf. *PBA*, Vol. XXII, Abst. 2009). The seed from which it was developed was introduced from China in 1923. It flowers and matures its seed much earlier than the common form of the species, and can be planted north of the limit of adaptation of the latter.

2018 Eichhorn, A.
A propos de la caryologie du *Lupinus tassilicus* Maire. (**Concerning the caryology of *L. tassilicus* Maire**).
Rev. Cytol. Biol. Végétale 1949 : **11** : 333–50.

A detailed description is given of mitosis in the euchromocentric species *L. tassilicus*, in which there are $2n = 36$ chromosomes. The nucleolus often persists till the end of metaphase; it then splits and the fragments thereafter slowly disappear.

2019 Lamberts, H.
A new type with a rapid youth growth in yellow lupins (*Lupinus luteus*).
Euphytica, Wageningen 1953 : **2** : 59–61.

A wild form of *L. luteus* producing vigorous early growth has been discovered in Palestine. At Wageningen, Netherlands, crosses between the new strain and a normal slow-growing type showed that rapid growth depends on a dominant gene, designated *Rp*. It is probable that this Palestinian strain will be more valuable for breeding improved fodder and cover crops than 7844 and 1686 (cf. *PBA*, Vol. XXII, Abst. 482), which carry recessive genes for rapid early development. The new form compares favourably with Weiko III, derived from 7844, in branching capacity, leaf colour, date of maturity and uniformity of ripening.

A fodder type, Pal I, and a bitter strain, Pal II, both selected from the Palestinian strain, have been submitted for inclusion in the central register of varieties.

Hybridization between the Palestinian type and Weiko III gave rise to an F_2 comprising plants with normal growth, types resembling either parent, and some individuals which grew fast and became very elongated. It is suggested that the latter may combine the homozygous recessives *cel cel* of Weiko III and the dominant factors of the Palestinian strain in a homozygous (*Rp Rp*) or heterozygous (*Rp rp*) condition.

2020 Wierzchowski, Z. & Obuchowska, I.
O nowych metodach oznaczania alkaloidów w łubinach pastewnych. (**On new methods of estimating alkaloids in fodder lupins**).
Roczn. Nauk Rol. 1952 : **61** : 159–92.

The authors' chemical methods of separation and gravimetric determination of the alkaloid content of lupins are fully described, with a critical survey of some earlier methods. Tables are given showing the alkaloid content of strains and varieties of *Lupinus luteus*, *L. angustifolius* and *L. albus*.

2021 Lamberts, H.
Resistance to mildew in yellow lupins.
Euphytica, Wageningen 1952 : **1** : 199–200.

A wild Spanish variety has shown resistance to mildew (*Erysiphe Polygoni*) at Wageningen,

Netherlands. The F_1 of crosses of this variety with susceptible strains consisted only of resistant individuals. Back crosses to susceptible lupins showed a segregation of 21 resistant: 14 susceptible plants. Among approximately 150 F_2 plants, 100 resistant individuals have been identified. Further work is to be carried out. This hereditary behaviour does not resemble that reported by Troll for a wild Portuguese form (cf. *PBA*, Vol. XIX, Abst. 2634).

2022 Weimer, J. L.
Lupine anthracnose.
Circ. U.S. Dep. Agric. 1952 : No. 904 : Pp. 17.

The circular includes a report of tests on the reaction of commercial varieties and introductions of *Lupinus* spp. to anthracnose (*Glomerella cingulata*). A number of introductions of *L. angustifolius* and *L. luteus* were highly resistant in the early stage of growth; *L. hispanicus* (PI 168537) was also highly resistant. The stems of resistant introductions further tested appeared to be highly resistant. The importations of blue lupin have the disadvantages of low vigour and a high proportion of hard seeds.

2023 **New strain of bitter lupine now offered for use on Florida farms.**
What's New Crops Soils 1953 : **5** : No. 5 : p. 23.

Alta, a new strain with a high degree of resistance to anthracnose, has been developed by selection at the Florida Agricultural Experiment Station to replace damaged stands of common blue lupin grown for soil improvement. It is adapted to a wide range of soils and produces a much greater tonnage of green manure than the common variety, which it also excels in seed yield.

2024 Del Gaudio, S.
Selezione della *Trigonella foenum-graecum* L. (**Selection of *T. foenum-graecum* L.**).
Ann. Sper. Agr. 1953 : **7** : 17–30.

A plant which differed from the others in having short wing petals bred true for this character in its progeny, which also displayed much stronger growth in the first 5–6 months and earlier flowering and fruit bearing. At maturity the plants with long wing petals were significantly larger but their seed yield was less, since they bore an average of only 5 pods per plant as compared with 8 on the short-winged ones. A positive correlation was found between height of stem and thickness of stem and between thickness of root and number of pods, and a negative correlation between length of stem and thickness of root. The pod length and number of seeds per pod were greater in the long-winged type, the higher yield of the short type being evidently conditioned entirely by its greater pod number. Owing to this greater yield and particularly its greater development during the green stage, the short-winged form is considered agriculturally superior to the normal form.

2025 Rodionov, V. A.
(***Lotus corniculatus*, a valuable perennial leguminous plant**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 41–47. [Russian].

A productive *Lotus* variety, 287, has been developed at the Institute of Grain Farming of the Nonblack-earth Belt from wild material found in Gorjkiĭ province.

ROOTS AND TUBERS

2026 Bejnar, W.
Krzyżówki wegetatywne u buraków. (**Vegetative hybrids in beets**).
Roczn. Nauk Rol. 1952 : **61** : 249–58.

In the course of work on vegetative hybrids, carried out in the Institute of Genetics and Cytology at Bydgoszcz, the following material was used in grafting: (1) the sugar beet strain AJ_1 of high sugar content; (2) the sugar beet strain 26, showing a high root yield; (3) the normal sugar beet strains 489 and 490; (4) the garden beet variety Freege; and (5) the mangels Eckendorf and Mammoth. To obtain the vegetative hybrids, (3) was grafted on (4), (1) on (2) and (2) on (1), (1) on (5), and (4) on a sugar beet of a variety unspecified; the graft of (1) on (5) failed to take. The influence of stock on scion was evident in the year of grafting.

2027 Castle, M. E., Foot, A. S. & Rowland, S. J.
Fodder-beet. Part II. A further comparison of Danish fodder-beet and English mangold in the south of England, 1950 and 1951.
Emp. J. Exp. Agric. 1952 : **20** : 316–25.

Details are given of the results of trials of the Danish fodder sugar beet varieties Red Øtofte X and Pajbjerg Red X and the Danish mangel Barres Øtofte X in comparison with the English mangel Yellow Globe, at two levels of nitrogenous manuring. The average dry matter content of Yellow Globe for the four seasons 1948–51 was 10%; that of Pajbjerg Rex X was 19·6%. Over the same four year period,

Pajbjerg Rex X gave an average yield of 3·49 tons dry matter per acre from the roots; the average dry matter yield of Yellow Globe was 2·90 tons. The dry matter of the roots of the beet varieties had a higher soluble carbohydrate content than that of Yellow Globe, and correspondingly lower contents of crude protein, fibre and ash; the Danish mangel occupied an intermediate position. The ratio of true to crude protein was higher in the beets than in the mangels. The advantages of fodder sugar beet as compared with mangel are discussed.

2028 **From cross to varieties list.**
Potato News 1952 : **2** : 9–13.

The procedures and organization of potato breeding in the Netherlands are outlined.

029 Andersen, E. T. & Sandar, N.
Description of the "Manota" variety of potato.
Amer. Potato J. 1953 : **30** : 50–52.

Manota (ND 134–19), newly licensed for sale in Canada, was selected from a cross made at Park River, N. Dak. It has given high yields in all parts of Manitoba since its introduction for trial in 1945. The tubers are white-skinned and shallow-eyed, possess good cooking and storage qualities and are more resistant to hollow heart than Irish Cobbler. Manota matures at mid-season and is thus particularly suitable for replacing the less adaptable Irish Cobbler and Canus on the heavy soils of the Red River Valley. Details are given of the origin of Manota from lines derived from Warba, Katahdin, Keeper Silverskin and Early Ohio Seed.

2030 Quelques variétés. Suite de la liste parue en Septembre 1952. (**Some varieties. Continuation of the list issued in September, 1952**).
Pomme d. Terre Franc. 1953 : **16** : No. 162 : 20–22.

Six more varieties of potatoes are described in this supplement to the list summarized in Abst. 450, namely, Aura Vilmorin, Aryo, Urgenta, Bona, Sirtema and Belle de Locronan.

2031 Pantjuhina, L. A.
(The effect of varied nutrition upon the development of important economic characters in seed potatoes).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 10 : 60–64. [Russian].

Training potatoes for productiveness and high starch content at the White Russian Agricultural Research Station is reported. The material, comprising a hybrid family from 10524s/47 x Erika, was grown upon varied soils, dressed with different fertilizers. The maternal parent was bred from Moskvič [Muscovite] x (*Solanum curtilobum* x Oktjabrenok [Little Octobrist]).

2032 Thijn, G. A.
Afstamming en nakomelingen van Rode Star. (**The ancestry and descendants of Rode Star**).
Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1952 : **9** : 18–20.

A pedigree table is amplified by an account of the origin and offspring of the famous Dutch potato Rode Star [Red Star]. The quality and economic value of some of the varieties in the table are mentioned.

2033 Dorst, J. C.
Two remarkable bud-sports in the potato variety Rode Star.
Euphytica, Wageningen 1952 : **1** : 184–86.

The two variants described, Bonte Rode Star [Variegated Red Star] and Groene Rode Star [Green Red Star], are probably periclinal chimeras in which a mutation affecting red coloration has occurred in the epidermis and subepidermis, respectively. Observations on these bud sports suggest that the tuber skin is chiefly derived from the epidermis, but that near the eyes, and especially below them, the skin originates from the subepidermis.

2034 Höppner, E.
Neue zugelassene Kartoffelsorten. (**New approved varieties of potatoes**).
Kartoffelbau 1953 : **4** : 55–56.

The Committee in Federal Germany for the authorization of varieties for seed production has approved the following potatoes: Heideniere, Lori, Luna, Ancilla, Margot, Vertifolia, Herkula and Nora. Their characteristics, including disease resistance and uses and cooking quality, are listed.

2035 Prakken, R. & Swaminathan, M. S.
Cytological behaviour of some interspecific hybrids in the genus *Solanum*, sect. *Tuberarium*.
Genetica 1952 : **26** : 77–101.

Several interspecific crosses between a diploid ($2n = 24$) and a tetraploid or hexaploid ($2n = 48$ and 72, respectively) are listed in which unreduced male or female gametes from the diploid parent took part. Cytological studies of the 48-chromosome F_1 of *S. Phureja* ($2n = 24$)

x *S. tuberosum* ($2n = 48$) and F_1 plants of *S. tuberosum* x *S. chacoense* ($2n = 24$) with 36 and 48 chromosomes showed that meiosis was regular in the 48-chromosome hybrids, but that the 36-chromosome hybrids were sterile. Fairly uniform F_2 progenies were obtained from all 48-chromosome hybrids.

During microsporogenesis in *S. chacoense*, meiosis was generally regular. Only a few dyads were noted, yet unreduced ♂ gametes appeared to function frequently in the cross with *S. tuberosum* when 48-chromosome hybrids were formed. In crosses with other diploid species, however, *S. chacoense* gives rise to normal reduced gametes, so that diploid hybrids are produced. It is concluded that selective or preferential fertilization by unreduced gametes occurs only when diploid species in this section of *Solanum* are crossed with polyploids. The possibility that postmeiotic disturbances may double the chromosome complement of a previously reduced gamete is briefly mentioned.

Bivalent formation in the tetraploid progenies is discussed with special reference to the basic chromosome number of the genus. The authors are of the opinion that there is insufficient evidence to show that the basic number is 6.

2036 Lamm, R.
Investigations on some tuber-bearing *Solanum* hybrids.
Hereditas, Lund 1953 : **39** : 97–112.

Hexaploid F_1 hybrids were obtained from chromosome-doubled *S. acaule* var. *subexinterruptum* ($2n = 96$) x *S. tuberosum* ($2n = 48$), but the reciprocal cross failed (cf. *PBA*, Vol. XV, Abst. 1054). The F_1 hybrids were vigorous, fairly fertile, and meiotically regular; the results of crosses with $2n$, $4n$ and $6n$ species indicated that the functional F_1 gametes were usually triploid. The F_1 hybrids could be reciprocally crossed with *S. tuberosum*, pentaploids being produced; it was however much more difficult to obtain seed when *S. tuberosum* formed the female parent; the progeny from this cross were completely male-sterile and also reduced in female fertility. Meiosis in the pollen mother cells of the male-sterile plants was abnormal; this sterility was probably due to interaction between the cytoplasm of *S. tuberosum* and one or more genes of *S. acaule*. With *S. tuberosum* as male, highly fertile pentaploids were secured. The F_1 hexaploids gave a few seeds when used as female parents in crosses with *S. acaule*. Crosses between the back-cross pentaploids and *S. acaule* or chromosome-doubled *S. acaule* failed. The results of repeated back-crossing of the F_1 hybrids to *S. tuberosum* suggest that it is possible to obtain relatively high fertility in plants combining the cytoplasm of *S. acaule* and the chromosomes of *S. tuberosum*. Some plants in the late back-cross progenies appeared to be of agricultural value. Causes of sterility and incompatability in sect. *Tuberarium* are discussed.

2037 Pohjakallio, O.
On the effect of day-length on the yield of potato.
Physiol. Plant. 1953 : **6** : 140–49.

In experiments at the University of Helsinki, Finland, long photoperiod prevented tuber formation in *Solanum demissum*. In F_1 clones from crosses between *S. tuberosum* and *S. demissum*, long day either prevented or noticeably retarded tuber formation. Long day had little effect upon tuber formation in *S. tuberosum* varieties. After onset of tuber formation, long day had a positive effect upon tuber yield in both *S. tuberosum* and the F_1 interspecific hybrids. Long day also increased the top yield, and delayed the maturity and withering of the haulms. Onset of tuber formation in the hybrids apparently depends upon photoperiodic stimulation; thereafter tuber yield is primarily determined by the energy economy of the plant.

2038 Koopmans, A. & van der Burg, A. H.
Chromosome number and chromosome behaviour of F_1 and F_2 plants of the cross *Solanum phureja* x *Solanum tuberosum*.
Genetica 1952 : **26** : 102–16.

Cytological analyses of root tip cells have shown that most of the F_1 and F_2 of *S. Phureja* ($2n = 24$) x *S. tuberosum* ($2n = 48$) were tetraploid ($2n = 48$); a few cells with 47, 49 or 50 chromosomes and one with 25 chromosomes were found. Most of the meiotic configurations observed in flower bud squashes had one quadrivalent; trivalents were sometimes seen. Of 40 F_1 plants grown at Wageningen and Groningen, Netherlands, 23 proved fertile. There appeared to be no cytological distinctions between sterile and fertile 48-chromosome plants, and it is suggested that segregation of sterility factors originating from *S. tuberosum* may be responsible for differences in fertility (cf. *PBA*, Vol. IX, Abst. 309).

A review of other interspecific *Solanum* crosses indicates that the formation of unreduced diploid gametes is generally accepted as an explanation for the occurrence of plants with higher chromosome numbers than the mean of both parental complements. The authors, how-

ever, point out that dyads are very rare in diploids; they consider that normal reduced ♂ and ♀ gametes are formed by the diploids but that these may be doubled, after the ♂ gamete enters the egg cell, owing to the influence of plasma from the tetraploid parent, either in the egg cell or introduced, in small quantity, by the ♂ gamete.

2039 Pushkarnath
Studies on sterility in potato. IV. Genetics of incompatibility in *Solanum aracc-papa*.
Euphytica, Wageningen 1953 : **2** : 49–58.

Data from crosses between self incompatible *S. Aracc-papa* and 14 other species at the Potato Breeding Station, Simla, show that *S. Aracc-papa* is female sterile, although ovary development is normal. Viable seeds are, however, set when *S. Aracc-papa* is the pollen parent in crosses with *S. Rybinii*, *S. chacoense*, *S. Caldasii* and *S. subtilius*. Male fertility proved to be transmitted to F_1 and back-cross progenies of *S. subtilius* x *S. Aracc-papa*. In conjunction with results obtained from previous investigations (cf. *PBA*, Vol. XII, Abst. 684, Vol. XIII, Abst. 402 and Vol. XVIII, Abst. 289), the present results suggest that basic sterility genes, $S^{12}S^{13}$, determining a homomorphic system of incompatibility in *S. Aracc-papa*, are modified by an independent factor designated *R*. When *R* is carried in a heterozygous or homozygous condition in the style, pollen tubes carrying *S* alleles cannot penetrate. The presence of *R* in the pollen has no influence on the action of *S* alleles.

2040 Höppner, E. & Geidel, H.
Kartoffel-Sortenversuche 1952. Ergebnisse der Versuche mit allen zugelassenen Kartoffelsorten. (**Potato variety trials, 1952. Results of trials with all the approved varieties of potatoes**).
Kartoffelbau 1953 : **4** : 22–25.

As in 1951 (cf. *PBA*, Vol. XXII, Abst. 2831), the performance of all officially approved varieties at 13 testing centres in Germany is recorded in tables showing the vegetative characteristics and yield of tubers. The medium-late to late group is discussed with particular reference to starch content.

2041 Kirkpatrick, M. E.
Cooking quality of potatoes: its evaluation and relationship to potato characteristics.
Amer. Potato J. 1953 : **30** : 52–53. (Abst.).

The Bureau of Human Nutrition and Home Economics, US Department of Agriculture, has published data on the relative palatability of six varieties grown at three centres. Dryness, mealiness, disintegration and sloughing of the cortex in boiled, mashed and baked potatoes were highly correlated with specific gravity and content of nitrogen and alcohol-insoluble solids. Analyses of multiple correlations showed that specific gravity combined with total nitrogen, and alcohol-insoluble solids together with total nitrogen, exerted greater influence on palatability than any component factors alone. Evaluation of specific gravity proved the most useful estimate of cooking quality for all varieties.

2042 Clark, C. F. & Lombard, P. M.
Descriptions of and key to American potato varieties.
Circ. US Dep. Agric. 1951 : No. 741 Revised : Pp. 57.

An identification key to 41 varieties is provided, followed by illustrated descriptions of these varieties and 18 others (cf. *PBA*, Vol. XVI, Abst. 1796).

2043 Bestimmung der Sortenechtheit und Sortenreinheit von Kartoffeln. (**Determination of varietal authenticity and purity in potatoes**).
LandbForsch., Völkenrode 1952 : **2** : 82–86.

Descriptions and photographs of the sprouts of the main German potato varieties are presented in illustration of their chief characteristics. The best agent for breaking dormancy is Rindite.

2044 Ochoa, C.
Dos nuevas especies silvestres de papas diploides del Perú. (**Two new wild species of diploid potato from Peru**).
Rev. Argent. Agron. 1952 : **19** : 231–37.

Descriptions are given of *Solanum neohawkesii* and *S. rhomboideilanceolatum*, both members of the series *Tuberosa*. The former species is extremely resistant to frost, highly fertile and crosses successfully with *S. goniocalyx*, *S. Yabari* and *S. stenotomum*.

2045 Nelson, C. I. & Parsons, J. L.
Family relationships in potato ring rot bacteria.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1952 : **14** : 215–17.

Isolates of *Corynebacterium sepedonicum* from apparently disease-free tubers at Fargo, N. Dak., failed to induce the characteristic ring rot symptoms produced by bacteria from severely diseased plants, thus providing evidence for the

existence of more than one strain of the pathogen.

2046 Zadina, J. & Folk, A.
Zkoušky vzdornosti odrůd světového sortimentu bramborů proti aktinomykosní strupovitosti. (**Testing a world collection of potato varieties for resistance to common scab**).
Sborn. Čsl. Acad. Zeměd. 1952 : **25** : 518–24.

Many varieties of potatoes were tested for their resistance to *Actinomyces scabies* at Keřkov, Větrov and Valečov. None of these proved immune from scab, though many showed a high degree of resistance under field conditions favourable to the development of the disease. It is suggested that this material should be used for breeding immune types.

2047 Howatt, J. L. & Hodgson, W. A.
Preliminary report on the occurrence of physiological races of *Phytophthora infestans* (Mont.) De By in eastern Canada.
Proc. Canad. Phytopath. Soc. 1953 : No. 20 : p. 17. (Abst.).

The potatoes Canso and Keswick, hitherto resistant to late blight in the field, showed infection in eastern Canada during 1951 (cf. *PBA*, Vol. XXII, Abst. 1251). At least six physiological races of the fungus were identified among the isolates studied.

2048 Black, W.
A genetical basis for the classification of strains of *Phytophthora infestans*.
Proc. Roy. Soc. Edinb. 1952 : **65** : Pt. I : Sect. B : 36–51.

Additional information is provided on the interrelationships of strains of *Ph. infestans* and four major genes, R_1, R_2, R_3 and R_4, controlling the blight resistance of potatoes (cf. *PBA*, Vol. XXII, Abst. 2039). Since dominance of the *R* genes is complete, a maximum of 16 phenotypic reactions to blight is possible; thus, theoretically, 16 strains of *Ph. infestans* should be distinguishable, each specially adapted to one particular genotype, its natural host, on which it is most prolific. Only 10 strains have so far been isolated. A table has been constructed to show the interrelationships between these strains and the host genotypes at a glance; it facilitates the calculation of segregation ratios resulting from mating any pair of host genotypes when infected with any strain or group of strains. Using the table it is possible to classify a strain according to the genetic constitution of the natural host. It is suggested that a universal scheme of nomenclature for strains of *Ph. infestans* might be based on this method of classification, each strain being known by the numerical subscripts of its host's *R* genes. Only one strain, designated 1,3,4, is capable of infecting a host carrying three *R* genes ($R_1R_3R_4$); no evidence is available to indicate whether fungal adaptation to complex genotypes has reached a limit, apart from the continued blight immunity of *Solanum demissum* ($R_1R_2R_3R_4$). Breeders are therefore advised to aim at the combination of all four genes.

2049 Mastenbroek, C.
Investigations into the inheritance of the immunity from *Phytophthora infestans* de B. of *Solanum demissum* Lindl.
Euphytica, Wageningen 1952 : **1** : 187–98.

Nine races of *Ph. infestans* have been found in the Netherlands. One race, N 3, is almost identical with the common race N 1. Reactions to the races show considerable overlapping, e.g. immunity from N 8 and N 9 includes immunity from all other races. Study of seedlings involving *S. demissum* in their pedigrees has led to the hypothesis that three dominant and independent genes, R_7, R_8 and R_9, determine immunity from late blight. The three genes give immunity from the different races as follows: R_7, N 1, N 2, N 4 and N 7; R_8, N 1, N 2, N 4, N 5, N 6, N 7 and N 8; and R_9, N 1, N 4, N 5, N 6 and N 9. Segregation ratios of duplex seedlings have indicated the possibility of random rather than preferential chromosome pairing. The presence of a fourth gene, $R_{2,5}$, conditioning immunity from N 1, N 2 and N 5, is suspected.

2050 Zadina, J.
Odrůdy bramborů vzdorné proti plísni *Phytophthora infestans*. [**Potato varieties carrying resistance to blight (*Ph. infestans*)**].
Sborn. Čsl. Acad. Zeměd. 1952 : **25** : 513–17.

Breeding potatoes for resistance to common blight at Havličkův Brod is reported. Economic properties of several domestic varieties, including Erika, Fitoftoraustoičivyi [Phytophthora Resistant], Kameraz I, Kameraz II, Monika, Robusta and Sandnudel, which show a high degree of resistance to 15 races of *Phytophthora*, are described.

Reference is made to infection trials of many promising hybrids derived from some of the above material.

2051 Vyščepan, A. G. & Meljman, M. E.
(The quality of wart-resistant potato varieties from the consumer's standpoint).
Sad i Ogorod (Fruit & Vegetable Gardens) 1952 : No. 12 : 62–66. [Russian].

The quality of the tubers, including flavour, cooking and keeping properties, and nutritive value of varieties showing resistance or susceptibility to wart was investigated at Kiev. Of the 16 resistant varieties Majestic received the highest and Carnea and Oktjabrenok [Little Octobrist] the next highest number of points for quality. Alma and Ella, which are susceptible varieties, also produced good quality tubers.

2052 Chauvin, R.
Nouvelles recherches sur les substances qui attirent le Doryphore (*L. decemlineata* Say) vers la pomme de terre. [**New investigations on the substances that attract the Colorado beetle (*L. decemlineata* Say) towards the potato**].
Ann. Inst. Nat. Agron., Paris 1952 : **3** : Sér. C : 303–08.

This article deals with the preparation of active extracts of the substance that attracts the Colorado beetle to the potato leaf and with the attractiveness of 11 varieties of potatoes to the pest.

2053 Webb, R. E., Larson, R. H. & Walker, J. C.
Relationships of potato leaf roll virus strains.
Res. Bull. Univ. Wis. 1952 : No. 178 : Pp. 40.

Using *Physalis floridana* as an indicator, 148 leaf roll isolates from potato growing areas of Canada and the USA were studied under greenhouse conditions. Four different strains were distinguished on the basis of severity of symptoms, temperature relations and cross protection inoculations. Russet Burbank, Red Warba and Green Mountain showed differential reactions to the four strains in the greenhouse, but in field tests at Hancock, Wis., these differences were not significant; thus severity of symptoms in the field gave no reliable indication of the inciting strain.

2054 McKay, R. & Loughnane, J. B.
Effects of some single viruses and of combinations of the same viruses on three potato varieties.
Sci. Proc. R. Dublin Soc. 1953 : **26** : 133–43.

Under field conditions in Dublin, yields of Arran Banner and President were reduced more by double inoculations with virus A plus either the mild or severe strain of virus X than by each strain separately. Majestic, however, was unaffected by all viruses except virus A plus a severe strain of virus X which reduced yields by 29%; the same virus combination reduced the yields of Arran Banner and President by 46 and 55%, respectively.

2055 Prüfung neuer Kartoffelzüchtungen auf Virusresistenz. (**Testing newly bred potato varieties for virus resistance**).
LandbForsch., Völkenrode 1952 : **2** : 86–88.

The methods whereby all new potato varieties are tested for their reaction to virus diseases before being certified for cultivation in the Federal German Republic are described.

2056 Pushkarnath, Deshmukh, M. J. & Pal, B. P.
Improved potato varieties for the plains of India.
Indian J. Genet. 1952 : **12** : 31–36.

Four new varieties which have shown promise in the plains of northern India are described: Hybrid 185 (President x Katahdin); Hybrids 208 and 209, both from (Ekishirazu x Katahdin) x Phulwa; and Hybrid 2236 [(*S. curtilobum* x *S. tuberosum*) x *S. andigenum*]. The hybrids are less susceptible to degeneration caused by viruses than the local commercial varieties. The organization of the breeding and initial testing which has resulted in the new varieties is outlined. The hybrids are now undergoing more extensive trial.

2057 Bagnall, R. H.
Potato seedlings hypersensitive towards *Solanum* virus 1, Smith (potato virus X), and a rapid means of detecting the reaction.
Proc. Canad. Phytopath. Soc. 1953 : No. 20 : p. 14. (Abst.).

Late blight resistant seedlings from the United States have been used as pollen parents in crosses with USDA 41956, a seedling possessing immunity from virus X, and with Epicure and Scottish seedlings showing a hypersensitive re-

action to this virus. Inoculation of cuttings grown in Vermiculite was a successful means of detecting the hypersensitive reaction.

2058 Bercks, R.
Über die Möglichkeit einer Virulenzänderung des Kartoffel-X-Virus. (**On the possibility of a change in the virulence of potato virus X**).
Phytopath. Z. 1953 : **20** : 113–30.

Further evidence (cf. *PBA*, Vol. XXI, Abst. 2806 and Vol. XXII, Abst. 1258) is advanced of the decline or extinction of virulence in strains of potato virus X after frequent passage through tobacco as a host. Possible explanations of the change are discussed in the light of the work of Matthews (cf. *PBA*, Vol. XX, Abst. 818) and other investigators.

2059 Timonen, T.
Pohjois-Suomen perunanviljelyn tarkastelua paikalliskoetulosten perusteella. (**Some observations on northern Finnish potato cultivation, based on the results of local experiments**).
Koetoiminta ja Käytäntö 1952 : **9** : No. 5 : p. 4.

A list of varieties which have been used for comparison with Ruusulehti [Rosafolia] is given, and data for yield/ha., starch percentages, keeping qualities and flavour are included. Puritaani [Puritan], Vesijärvi [Harbinger] and Green Mountain are recommended as the best food potatoes for nothern Finland.

2060 Petersson, G. & Svensson, E.
Sort- och gödslingsförsök i potatis. (**Varietal and manuring trials with potatoes**).
Lantmannen, Stockholm 1953 : **37** : 279–81.

A preliminary account is given of the results of trials of industrial, fodder and table potatoes at Ugerup Experimental Farm, Sweden, during 1941–51. The yield of tubers, dry matter and starch, as well as the starch content are recorded. Among the newer industrial varieties, Robusta and Daniella are mentioned for their high yield of starch, but the latter is not recommended for very large plantings owing to its lateness.

2061 Cordner, H. B.
Allgold. A new high-vitamin, high-yielding sweet potato.
Bull. Okla. Agric. Exp. Sta. 1952 : No. B–388 : Pp. 11.

A detailed account is given of the sweet potato Allgold (cf. *PBA*, Vol. XX, Abst. 2416).

2062 Torres, C. B.
Observações preliminares sôbre o florescimento da batata doce (*Ipomea batatas*, Poir.). [**Preliminary observations on the flowering of the sweet potato (*I. batatas* Poir.)**].
Agros, Rio Grande do Sul 1950 : **3** : 38–43.

Although a short photoperiod of 10 hours stimulated flowering in most varieties, there was variation in the photoperiodic requirements of the varieties and one, Rainha [Queen], initiated flowering in a photoperiod not less than 12 hr. 20 min.

2063 Pen Ching Cheo.
Varietal differences in susceptibility of sweet potato to black rot fungus.
Phytopathology 1953 : **43** : 78–81.

Four types of reaction to black rot (*Endoconidiophora fimbriata*), ranging from a high level of resistance to considerable susceptibility, were recognized in root tests of over 100 varieties and in tests on stems of cuttings and sprouts of 25 varieties. Root and stem resistance were highly correlated. Resistance was physiological, since no difference was detected between the rates of formation of cork periderm in a resistant seedling and the susceptible variety Yellow Jersey.

2064 Gopal Iyengar, K.
Sweet potato.
Mysore Agric. J. 1951 : **27** : 29–30.

An analysis of the relative productivity of many red and white types collected in different parts of Mysore has been carried out at the Central Farm, Hebbal. Heaviest yields were obtained from Deenabandhu, Sojiga and Raja, all bearing red tubers. Both Deenabandhu and Sojiga are early varieties, and are therefore recommended to local growers.

FIBRES

2065 Ware, J. O. & Waddle, B. A.
Southwest Arkansas cotton variety test for 1952.
Mimeogr. Ser. Ark. Agric. Exp. Sta. 1953 : No. 12 : Pp. 6. (Mimeographed).

Data are presented concerning the evaluation of 25 varieties at two centres typical of the upland and so-called bottomland soils of the region. Several varieties have given consistent yields of lint per acre from 1948 to 1952.

2066 Muhammed Afzal
Improvement of the cotton plant.
Pakist. Cott. Bull. 1952 : **1** : No. 1 : 3–8.

Cotton breeding problems in Pakistan are briefly discussed. Extensive use of Harland's

technique of mass pedigree selection is recommended, instead of aiming at the usual pure varieties (cf. *PBA*, Vol. XX, Abst. 1012–13).

2067 Ansari, M. A. A. & Qari, F. M. A.
Extension of M-4 cotton (N.T. Sind) in Sind and beyond.
Pakist. Cott. Bull. 1952 : **1** : No. 2 : 10–15.

Information is given on the growing importance of M 4 (*Gossypium hirsutum*) in Pakistan; its derivatives are also being successful in several parts of India. In addition to its wide adaptability, earliness, hardiness, high yielding ability, good ginning outturn, 1″ staple and spinning value of 34's, M 4 has the useful character of resistance to the physiological disorder termed red leaf. M 4 is being reselected and also used in crosses with *G. barbadense* and other types of *G. hirsutum* at Mirpurkhas.

2068 De Coene, R.
Les méthodes et les progrès de la sélection du cotonnier à Bambesa. (**The methods and progress in cotton breeding at Bambesa**).
Bull. Inform. INEAC 1952 : **1** : 289–304.

An historical survey is given of cotton breeding methods at Bambesa since 1921 with observations on the criteria adopted, on the multiplication and control of new varieties under the various local conditions, on the elaboration of crossing methods in improving yield and quality, and on breeding for wilt resistance (cf. *PBA*, Vol. XXII, Abst. 2542).

2069 Miège, J.
Sur quelques mutations de cotonniers. (**On some mutations in cotton**).
CR Prem. Conf. Internat. Africanistes Ouest 1950 : **1** : 471–76.

Descriptions are given of cotton mutants of the following types observed in cotton selection work: (1) male sterility; (2) curled leaves; and (3) protogyny.

2070 Góes, O. C.
Cromossomos do gênero *Gossypium*. III. Algodoeiro Rim-de-boi. (**Chromosomes of the genus *Gossypium*. III. The cotton Rim-de-boi**).
Arch. Jard. Bot. Rio de J. 1950 : **10** : 5–11.

Data are presented concerning the somatic chromosomes of the Brazilian cotton Rim-de-boi [Ox Kidney], showing it to be one of the American group with $2n = 52$.

2071 Miège, J.
Exemples de tricotylie chez le cotonnier. (**Examples of tricotyledony in cotton**).
CR Prem. Conf. Internat. Africanistes Ouest 1950 : **1** : 477–84.

The occurrence of tricotyledony in cotton, *Hibiscus* spp. and *Eugenia Jambos*, and, as a diagnostic character, in *Cola* is considered together with other cotyledonary anomalies of various types. From his observations to date the writer inclines to think that tricolyledony in *Gossypium* and *H. esculentus* is not hereditary, but that further study is needed to decide the question.

2072 Nanjundayya, C.
Technological reports on standard Indian cottons, 1951.
Technol. Bull. Indian Cott. Comm. 1952 : Ser. A : No. 79 : Pp. 88.

Data are presented on the fibre properties and spinning value of 18 standard varieties (cf. *PBA*, Vol. XXII, Abst. 1275). In the 1950–51 season Laxmi and Jayadhar were added to the list of standards for Bombay.

2073 Patel, G. B. & Patel, C. T.
Long staple cotton from hybrid seed of crosses between "*hirsutum*" and "*barbadense*" species.
Indian Cott. Gr. Rev. 1952 : **6** : 205–10.

The results of trials of heterotic F_1 hybrids between Co. 2 (*Gossypium hirsutum*) and Sea Island (*G. barbadense*) suggest that such hybrids may be valuable for the production of extra long, fine and strong cotton with quality approaching that of Egyptian cotton. The hybrids respond well to irrigation and manuring, and very wide spacing is necessary. The cost of Rs.20/= for sufficient hybrid seed to plant 1 acre is not regarded as prohibitive, in view of the increases in yield of high quality cotton obtainable. Preliminary results indicate the possibilities of raising the crop year after year by ratooning and of propagating the hybrids by cuttings. With ratooning, use of perennial *G. hirsutum* as one parent is recommended.

2074 Ansari, M. A. A.
Maintenance of purity in improved cottons.
Pakist. Cott. Bull. 1952 : **1** : No. 1 : 9–15.

The three improved strains at present being distributed in Sind are described, viz. 27–WN or SNR (*Gossypium arboreum*), 289 F–1 and M 4 (*G. hirsutum*). Methods of evolving superior

cottons and the stages of seed multiplication are outlined.

2075 Ware, J. O.
Breeding varieties of cotton for mechanical picking.
Arkans. Fm Res. 1952 : **1** : No. 4 : p. 2.

The characters of the boll, lint and leaf giving suitability for harvesting by the spindle type of picker are discussed. Work is being carried out in Arkansas on the introduction of smooth foliage, hard rough lint and other required characters into commercial cottons.

2076 Bird, L. S.
New cotton strains resist bacterial blight.
What's New Crops Soils 1953 : **5** : No. 5 : 16–17.

Progress in developing blight resistant strains of Deltapine, Stoneville and Empire cotton at College Station, Tex., by incorporating the resistance of Stoneville 20, is reviewed. Particular reference is made to a technique for inoculating test seedlings by forcing the inoculum under pressure through the stomata on the abaxial leaf surface.

2077 May, A. W. S.
Jassid resistance of the cotton plant.
Qd J. Agric. Sci. 1951 : **8** : 43–68.

Five types of terminal injury due to jassid activity were distinguished; each type of reaction was related to the nymph population on the terminal shoot irrespective of the variety and the state of growth of the crop at the time of sampling. Varietal susceptibility can therefore be expressed in terms of an index based upon the reaction types. Varietal response to jassids is conditioned by the reproductive potential of the terminal shoot, since in each variety the mean nymph population and resistance index are correlated. A dense cover of simple unbranched and long stellate hairs over the entire surface of the leaf midrib is essential for resistance to oviposition; such a long and dense cover is associated with hairiness of the remainder of the plant. In the absence of a jassid population, selection for midrib hairiness provides the most satisfactory criterion of resistance.

2078 **Flax breeding in the Netherlands.**
Windmill, The Hague 1953 : No. 9 : 16–17. (also in French, 14–16; and German, 17, 19).

The three white-flowered varieties of flax, viz. Concurrent, Wiera and Formosa, which have been placed on the Netherlands Descriptive List of Varieties of Field Crops for 1953, are discussed (cf. p. 484). Blue-flowered varieties on the list are cited.

2079 De Haan, H.
Flax breeding and flax varieties in the Netherlands.
Euphytica, Wageningen 1952 : **1** : 212–18.

The aims, methods and organization of fibre flax breeding in the Netherlands are outlined. Information is also given on breeders' royalties, Dutch flax breeding personnel and the status of commercial varieties.

2080 **Beryllium aids flax breeding.**
What's New Crops Soils 1953 : **5** : No. 6 : p. 26.

Brief reference is made to the use of radioactive beryllium at Saskatchewan University for increasing the rate of mutation in flax, thus accelerating the possible development of improved varieties.

2081 Dillman, A. C.
Classification of flax varieties, 1946.
Tech. Bull. U.S. Dep. Agric. 1953 : No. 1064 : Pp. 56.

This copiously illustrated bulletin provides a discussion of the origin of cultivated flax, a literature review, an analysis of the characters of the plant and flower, 12 keys for specific and varietal identification, based upon work begun in 1925 in the United States, and information on the characters, history and distribution of the varieties classified.

2082 **Australian developments. Flax breeding.**
World Crops 1953 : **5** : p. 77.

The release of Boyup, an early maturing flax variety developed from Wada x Concurrent by the West Australian Department of Agriculture, is reported. Boyup has taller, stronger stems than Wada, is more rust resistant than either parent, and gives high fibre yields.

2083 **Punjab 53 flax released for seed increase in '53.**
What's New Crops Soils 1953 : **5** : No. 5 : p. 25.

Punjab 53, a wilt resistant selection with an oil content of 40·5%, 1% higher than that of older Punjab types, has been released by the University of California.

2084 Šuvaev, I. S.
(The effect of the properties of the female parent upon the development of economically important characters in hemp hybrids).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 8 : 18–23. [Russian].

The influence of the female parent upon hereditary characters in various hemp hybrids was investigated at Harjkov. The initial material comprised introduced and local varieties with different economic, biological and morphological characters. It was found that the F_1, F_2 and F_3 resembled the female parent, although the degree of resemblance of different hybrids varied in all respects but seed colour and degree of resistance to *Orobanche*. Hybrids between two varieties introduced from other districts showed the characters of the female parent; these became less marked when the hybrids were back-crossed to the male parent. The maternal characteristics predominated in the hybrids between local and introduced varieties, involving the local variety as female parent. Back crosses to the male variety, in this instance, produced no appreciable changes in the characters of the hybrids. The hybrids from a cross between two local varieties had the characters of both parents, but resembled the female parent more than the pollinator. Crosses involving an introduced variety as a female parent and a local variety as a pollinator gave hybrids that resembled the male parent. Crosses between two local or two introduced varieties with similar economic properties gave an F_1 which was more vigorous than the initial forms. Open intervarietal pollination increased the yield of seed in late and that of fibre in early varieties. At the same time slight decreases in the fibre yield of the late and in the seed yield of the early types occurred. Hybrids derived from a female variety of local origin were indistinguishable from it morphologically, while those from crosses involving an introduced variety as a female parent showed great variability.

2085 Isotalo, T. A.
Hamppu mutasuomaiden viljelykasvina. **(Hemp as a cultivated plant for bog soils).**
Koetoiminta ja Käytäntö 1952 : **9** : No. 5 : 1–2.

In a discussion of various aspects of hemp cultivation in Finland, comparative data are included for the fibre yields of local early varieties and late varieties from Jugoslavia and Hungary. These latter give about four times the yield of the early varieties, but do not produce seed under Finnish conditions.

2086 Datta, R. M.
Meiosis in some *Corchorus* spp.
Sci. & Cult. 1953 : **18** : 385–86.

The writer confirms the observations of Mukherjee that the chromosome number of *C. tridens* and *C. trilocularis* is $n = 7$ (cf. Abst. 1334), and states that since 1950 he has been carrying out cytological investigations on several wild species of *Corchorus* at the Jute Agricultural Research Institute, Barrachpore, Bengal.

2087 Relander, E.
Jalopajukokeista saatuja tuloksia Suomessa. **(Some results obtained in Finland in experiments on willow cultivation).**
Koetoiminta ja Käytäntö 1952 : **9** : No. 6 : p. **4**.

Experiments are described in which several varieties of *Salix* were cultivated on a range of soil types in a number of different localities in Finland, and details of comparative yields of withes in kg./hectare are given. The types listed are also compared for length of withe, suitability for cutting, and branching habit, and remarks on frost resistance, vegetative period and general properties are included. *S. viminalis* produces the highest yields, but its merits are offset by the coarseness of the withes.

SUGAR AND STARCH PLANTS

2088 Venkoba Rao, B.
Varietal composition of sugarcane in Mysore State.
Mysore Agric. J. 1951 : **27** : 37–41.

Changes in the relative popularity of sugar cane varieties from 1939 to 1949 are reviewed. Many local canes have been replaced by high yielding varieties bred at Coimbatore and Mysore. Among the new selections developed on Government Experimental Farms, IC 8, 26, 29, 136 and 215 have proved outstanding in local trials.

2089 Stevenson, G. C.
The Barbados sugar cane varieties.
Bull. B.W.I. Cent. Sug. Cane Breed. Sta. 1952 : No. 42 : Pp. 32.

The first of a series of illustrated descriptions of varieties which have reached commercial prominence in the Caribbean area since 1937 provides a genealogical chart showing the interrelationships of canes developed at the BWI Central

Sugar Cane Breeding Station, with notes on the *Saccharum* species which have been involved in hybridization, and an explanation of the system of numbering. This issue deals with the following: B 3337, B 3439, B 34104, B 37161, B 37172, B 4098, B 41211, B 41227 and B 4362. Each description includes details of parentage, derivation of parents, growth habit, morphology, chromosome number, disease reaction, juice quality, range of adaptability, and breeding behaviour in Barbados.

2090 Turner, P. E.
Researches on sugar cane agriculture in the British West Indies and British Guiana, 1950-51.
B.W.I. Sug. Ass., Trinidad 1952 : 1–58.

Stevenson, G. C.
Sugar cane breeding and variety testing, 1951.
Ibid. 1952 : 59–62.

Cultural methods in Antigua, Barbados, British Guiana, Jamaica, St. Kitts and Trinidad are discussed in relation to soil type, and reports are given on the performance of selections distributed by the Central Sugar Cane Breeding Station, Barbados (cf. *PBA*, Vol. XXI, Abst. 1303 and Vol. XXIII, Abst. 1344). Special reference is made to the release of B 4744 and B 47419.

2091 **Distribution of plant cane. Programme for 1953.**
S. Afr. Sug. J. 1953 : **37** : p. 109.

A new sugar cane, N : Co. 292 (Co. 421 x Co. 312), is being released to growers in South Africa as a useful alternative to other commercial varieties recently developed from the same cross. It gives good yields of cane but the sucrose content is slightly below that of Co. 301. N : Co. 292 is not prone to any disease; although the leaves become yellow during drought, recovery is rapid after rain.

2092 Dutt, N. L.
Report on the survey of sugarcane research and development in India.
Indian Cent. Sug. Cane Comm. 1950 : Pp. 337.

This is the third reprint of a survey first published in 1944, with the addition of a map showing the areas in which improved varieties are being grown. The first part deals with general cultural problems and reviews the achievements of the main breeding stations, with special reference to the need for undertaking all breeding at one centre, preferably at Coimbatore. In the second part the progress of varietal testing and selection in each of the provinces is outlined and recommendations are made to growers. The last part summarizes research financed by the Imperial Agricultural Research Institute, New Delhi; this includes cytogenetical investigations on interspecific and intergeneric hybridization at Coimbatore.

2093 M. -L., H.
Cytology of the sugar cane. Breeding problems arising from chromosomal complexities.
Int. Sug. J. 1952 : **54** : 151–53.

A general account is given of the application of genetical research, including work on artificially induced polyploids and somatic mutations, to the practical problems of sugar cane breeding. The practice of vegetative multiplication which avoids the need for securing pure lines is discussed in relation to the advantages of continual introduction of new genes by extensive interspecific hybridization, increasing genetical impurity. The possibility of establishing a degree of purity necessary for the exploitation of hybrid vigour is also considered.

2094 Calma, V. C. & Anday, R. R.
The first ratoon, first-generation plant canes, and parents of (POJ 2878 x P.S.A. 14) F_1 seedlings.
Philipp. Agric. 1951 : **35** : 252–59.

Analyses of variability among F_1 sugar cane seedlings from the cross POJ 2878 x PSA 14 (cf. *PBA*, Vol. XXI, Abst. 1204) have been extended to the canes grown from F_1 seed pieces and F_1 ratoons at the College of Agriculture, Laguna, Philippines. Several selections resistant to Fiji disease have been obtained. Three selections, 46, 71 and 137, exceeded both parents in respect of weight of millable stalks per stool and had a juice purity of 78·45–88·39%. The juice purity of selection 93 averaged 88·47%. All four selections are to undergo trials with standard local varieties.

2095 Brett, P. G. C.
Further progress in sugarcane breeding in Natal.
Proc. 26th Ann. Congr. S. Afr. Sug. Technol. Ass. 1952 : 116–23.

Crosses made during 1950 and 1951, and numerous selections from seedlings raised in 1949 (cf. *PBA*, Vol. XXI, Abst. 2011), are listed. Varieties which are valuable parents for producing seedlings adapted to local conditions include Co. 312, Co. 331 and Co. 421. Many

crosses and back crosses are being carried out between commercial canes and Javanese Glagah in order to combine the mosaic resistance of the latter with other desirable characters; it is pointed out that most of the resulting progenies will be trispecific hybrids derived from *Saccharum officinarum*, *S. Barberi* and *S. spontaneum*. With the development of local cane breeding, introductions from Queensland and Florida are no longer confined to varieties for immediate commercial production but include selections suitable for breeding only.

2096 **Report of the Experiment Station Committee of the Hawaiian Sugar Planters' Association 1952** : Pp. 77.

Relative advantages of different sugar cane breeding techniques are discussed. Many superior parents, including 39–7028, 39–3633 and 44–3098, were obtained by the melting-pot method of crossing, indicating the desirability of genetic diversity. Although immediate yield increases would result from restricting hybridization to a few such élite canes, this sacrifice of genetic diversity is not contemplated. Some indication is given of the wide range of crosses undertaken during the season; Trojan from Queensland, M 134/32 from Mauritius and CP 44/101 from Louisiana were among the many introductions used. Outstanding seedling selections are briefly described.

Photoperiodic investigations were continued (cf. Abst. 518). In an attempt to induce early flowering in 37–1933 and 32–8560, day lengths in August were shortened to correspond with those of September; this treatment, however, inhibited all flowering.

A disease survey is being carried out at Yaqara, Fiji, where many selections are undergoing trials for resistance to downy mildew and Fiji disease. Reference is made to the newly discovered *Sclerospora* disease, already found in Australia (cf. *PBA*, Vol. XXII, Abst. 524), Louisiana and Peru.

2097 **Distribution of N : Co. 334 cane.**
S. Afr. Sug. J. 1952 : **36** : p. 723.

N : Co. 334, developed from Co. 421 x Co. 312, is to be released by the Experiment Station of the South African Sugar Association. It produces uniform stands which do not lodge readily, and is more resistant to smut than N : Co. 310, Co. 301 or Co. 331. The sucrose content of N : Co. 334 is equivalent to that of Co. 301 but its cane yield is superior, especially on sandy soil.

2098 Arceneaux, G., Hebert, L. P. & Mayeux, L. C. (Jun.).
Effects of breakage on plant development and field production with sugarcane.
Tech. Bull. US Dep. Agric. 1952 : No. 1059 : Pp. 15.

Similar reductions in yield of sugar per acre were recorded at Houma, La., when 80–100% of the stalks of CP 29/120, CP 34/120 and Co. 290 suffered damage comparable to that caused by high winds. When 20–60% breakage occurred, however, the erect CP 29/120 showed greater yield losses than the more recumbent types Co. 290 and CP 34/120, which were better able to utilize additional sunlight penetrating damaged stands. The tendency to develop lateral shoots after decapitation was more marked in Co. 290 and CP 34/120 than in CP 29/120, but an increase in axillary growth of both broken and unbroken stalks was noted in all stands as the percentage of damage increased.

2099 Robertson, J. S.
"Leaf scald" investigation.
Sug. Bull. Georgetown 1952 : No. 20 : 53–58.

In view of the prevalence of leaf scald on commercial sugar cane in British Guiana, many breeding lines have been imported from Barbados for resistance trials. Canes showing some resistance under local conditions are being selected as parents for future crosses. It is pointed out that B 4098, the most resistant commercial variety (cf. *PBA*, Vol. XXII, Abst. 2873), is very susceptible to the moth borer which is increasing in the Berbice district.

2100 Fors, A. L.
Further notes on "Pepe Cuca" cane. Comparisons with the Co. varieties.
S. Afr. Sug. J. 1952 : **36** : 701–13.

Additional data are provided on the performance of Pepe Cuca sugar cane (POJ 2878 x Co. 281) in Cuba (cf. *PBA*, Vol. XXI, Abst. 1209 and XXII, Abst. 2884). Although Pepe Cuca is susceptible to pineapple disease, it is better adapted to local conditions than either Co. 281, Co. 301 or Co. 331.

2101 Steindl, D. R. L. & Hughes, C. G.
Ratoon stunting disease.
Cane Gr. Quart. Bull. 1953 : **16** : 79–95.

Investigations concerning the occurrence and nature of this disease of sugar cane in Queensland are reviewed, with particular reference to Q 28 in which the virus was first discovered.

Data indicate that heavy losses frequently result from infection of M 1900 S, POJ 2878, Q 28, Q 42, Q 45, Q 813 and Trojan, whilst Badila, Pindar, CP 29/116, Q 47 and Q 50 may give reasonable yields even when infected.

2102 Abbott, E. V.
The occurrence of a hitherto unrecognized growth-retarding disease of sugarcane in Louisiana.
Sug. Bull., N. Orleans 1953 : **31** : 116–20.
Both CP 36/105 and CP 44/101 showed a higher incidence of stunting in the field than other commercial varieties. The disease proved to be transmissible by juice inoculation and showed other similarities to the virus infection causing varietal deterioration of Q 28 in Queensland (cf. *PBA*, Vol. XXII, Abst. 1291).

2103 **In the field with Lloyd Lauden.**
Sug. Bull., N. Orleans 1953 : **31** : p. 114.
Brief reference is made to sugar cane crosses carried out during the current season under controlled photoperiodic conditions at Canal Point, Fla. Many crosses were made to improve resistance to the stunting disease recently diagnosed in Louisiana (cf. Abst. 2102).

2104 Knowles, W. H. C. & Cameron, C.
Field experiments with sugar cane, XX.
Sug. Bull., Georgetown 1952 : No. 20 : 1–33.
Data are provided on yield trials carried out in representative localities of British Guiana with seedling and ratoon selections of different ages introduced from Barbados. The Demerara seedling D 62/43 has compared favourably with B 41227.

2105 Christie, G. A.
Lower Burdekin Sugar Experiment Station.
Cane Gr. Quart. Bull. 1953 : **16** : 126–29.
The establishment of this new station in Queensland is described and mention is made of trials of seedling sugar canes undertaken since 1950.

2016 Rasmusson, J.
Autotetraploid sugar beets. Vitality changes in subsequent generations.
Hereditas, Lund 1953 : **39** : 257–69.
Several subsequent generations (C_2–C_6) of colchicine-induced tetraploid strains were subjected to field trials, their yields of roots and sugar being compared by means of the deviations from a diploid standard type. All the C_0 strains were produced by the method of dipping the flower stalk in colchicine solution. Without intentional selection, the tetraploids showed improved vigour and productivity between the C_3 and C_6 generations, reaching the level of comparable diploids. The poor performance of the C_0–C_3 earlier generations, it is suggested, may be due to cytological and genic unbalance, which is gradually eliminated by natural selection in later generations.

2107 Zosimovič, V. P.
(Productivity and sugar content of biological types of sugar beet varieties in relation to the dynamics of their leaf development.)
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 21–27. [Russian].
At the USSR Sugar Beet Institute, analyses of several varieties and hybrids have established three distinct biological types within each variety differing in respect of root formation and sugar yield. The first type comprises individuals notable for extensive early development and wilting of their leaves. The yield and sugar content of these forms are low. The second type differs from the above in its extensive leaf formation throughout the growth season. Such plants produce progenies with large roots and high sugar content. Lastly, some varieties include midseason and late forms which develop leaves extensively during the later part of the growth season until they are harvested in October. These forms also give material with large roots and high sugar content.

2108 Margara, J.
Comportement des variétés de betterave sucrière à l'égard du *Cercospora* ; problèmes que pose l'obtention de types résistants.
(Behaviour of varieties of sugar beet with regard to *Cercospora*. Problems that arise with reference to obtaining resistant varieties).
Ann. Inst. Nat. Rech. Agron., Paris 1952 : **2** : Sér. B : 215–29.
The study of numerous French and other varieties showed that all were susceptible to *Cercospora* except the American varieties US 215 x 216/3 and US 215 x 216, the German beet Klein Wanzleben R.C., the Hungarian variety Beta Y19 and an Italian variety RD2 (Rovigo) which showed varying degrees of resistance.
The main objective for French breeders must be to produce a resistant or semiresistant variety which will also give a satisfactory yield in the absence of *Cercospora*, as experiments showed that the resistant types tested in France did not do so.

2109 Bolhuis, G. G.
L'emploi de la réaction par la couleur de Guignard dans la sélection du manioc. (**The utilization of Guignard's colour reaction in cassava breeding**).
Rev. Int. Bot. Appl. 1952 : **32** : 559–64.
The reaction described provides a rapid and cheap method of determining approximately the toxicity of varieties, but it cannot be used for botanical classification.

STIMULANTS

2110 Ferrer, L. G.
A review of experiments and investigational work on tobacco of the aromatic cigarette type in the Philippines (1921-1941).
Philipp. J. Agric. 1951 (1952) : **16** : 85–96.
Reference is made to crosses undertaken at the Central Experiment Farm, Manila, and the College of Agriculture, Laguna, to produce good quality hybrids capable of outyielding both parents.

2111 Powers, H. R. (Jun.) & Lucas, G. B.
Variation within *Phytophthora parasitica* var. *nicotianae*.
Plant Dis. Reptr. 1952 : **36** : 335–36. (Mimeographed).
Blackshank resistant tobacco varieties have maintained their resistance for many years in the United States; this fact, together with the results of pathogenicity tests of isolates, has indicated that the above fungus is relatively stable. A weakly pathogenic strain has however been obtained in North Carolina.

2112 Ternovskiĭ, M. F.
(**Nonsusceptibility to powdery mildew of vegetative hybrids of tobacco**).
Dokl. Acad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **80** : 437–40. [Russian].
At Krasnodar, the inheritance of resistance to mildew of the first and later seed generations of Trebizond KV grafted on American 315, Ostrolist [Pointed Leaf] on Trebizond 300 and Samsun 960 on Trebizond 314 was investigated. The varieties serving as scion were susceptible and those as stock immune to mildew. The immune varieties had been bred previously by the author. The seed generations of the grafted plants gave fewer immune forms than the sexual progenies from crosses involving the same components. However, the number of immune forms produced by the former increased progressively in the later seed generations. Some families, e.g. family 122 from Trebizond KV on American 315, which was studied from the F_1 to F_6, gave no true-breeding segregates in respect of resistance to mildew. In this respect they resembled some sexual hybrids of *Nicotiana glutinosa* x *N. Tabacum*, which failed to produce constant forms for eight generations. Several true-breeding forms in respect of resistance to mildew in the F_3 and F_4 remained constant in the later generations. The number of true-breeding forms in progenies of the vegetative hybrids was smaller than that in progenies of the sexual hybrids. No immune or intermediate forms were found in progenies of the susceptible families.

2113 van der Knaap, W. P.
Blisterblight-resistentie van theeheesters en theeclonen. (**Blister blight resistance of tea bushes and clones**).
Arch. Theecult. Ned.-Ind. 1952 : 69–98.
This account of research in progress in Java deals with: the criteria used in selection of mother plants and clones for resistance to *Exobasidium vexans*; the relation between productivity and (1) susceptibility and (2) number of infected leaves; variation in infection in controlled seedlings as compared with clones; the relation between intensity of light in a plantation and infection in a clone and between tannin content and susceptibility.
Relevant research by English investigators in Ceylon is cited and its value as a basis for research in Java is indicated, with suggestions regarding the lines of research and methods to be followed in future selection work there.

2114 Mendes, J. E. T.
Ensaio de variedades de cafeeiros III. (**Test of coffee varieties, III**).
Bragantia 1951 : **11** : 29–43.
The results of the years 1947–50 are now added to those previously published (cf. *PBA*, Vol. XIII, Abst. 263 and Vol. XXI, Abst. 1245). The variety Bourbon Amarelo [Yellow Bourbon] gave the highest yield in each of the four years, Maragogipe had the largest seeds and Amarelo do Botucatu the earliest maturity.

2115 Morales, A.
Análise estatística do ensaio de variedades de café: Parte II. (**Statistical analysis of the test of coffee varieties : Part II**).
Bragantia 1951 : **11** : 45–49.
The statistical analysis of the results referred to in Abst. 2114 is presented, showing that the difference in yield of Bourbon Amarelo [Yellow Bourbon] over Bourbon and the others is significant and continues to increase, whereas

some of the other varieties have reached stability.

2116 Thirion, F.
Vingt années d'amélioration de la culture du caféier Robusta à Yangambi. (**Twenty years of work to improve the cultivation of Robusta coffee at Yangambi**).
Bull. Inform. INEAC 1952 : **1** : 321–56.

This review includes information on the collections of foreign and local breeding material at the Yangambi Research Station; the criteria employed in selection and testing of the mother trees for yield and quality; the vegetative and sexual multiplication of chosen élites; hybridization and crossing; and regional trials (cf. *PBA*, Vol. XXII, Abst. 2542).

2117 Addison, G. & Tavares, R.
Hybridization and grafting in species of *Theobroma* which occur in Amazonia.
Evolution 1952 : **6** : 380–86.

Experiments have been carried out at the Instituto Agronómico do Norte, Belém do Pará, Brazil, on crossing among the nine species of *Theobroma*. *Th. Cacao* was the only species which, when used as female, was able to produce hybrid seeds from most crosses. Some of the various crosses were successful, but the hybrid seeds tended to show deficient germination, and the seedlings were often feeble. Adult hybrids were secured from the following: *Th. grandiflorum* x *Th. obovatum*; *Th. grandiflorum* x *Th. subincanum* and the reciprocal; and *Th. Spruceanum* x *Th. speciosum* and the reciprocal. The degrees of success of interspecific hybridization and of grafting showed a strong positive correlation. On the basis of the data obtained the species are classified into four groups: (1) *Th. subincanum*, *Th. grandiflorum* and *Th. obovatum*; (2) *Th. Cacao* and *Th. microcarpum*; (3) *Th. speciosum*, *Th. Spruceanam* and *Th. bicolor*; and (4) *Th. Mariae*.

2118 **Fourth Meeting of the Inter-American Technical Cacao Committee, June 9 to 16, 1952, Guayaquil, Ecuador.**
Cacao, Turrialba 1952 : **2** : Nos. 28–33 : 2–16.

In a section on selection and propagation, G. F. Bowman contributed a paper entitled "The need for re-evaluation of selection programs for cacao." No adequate proof, it was argued, has been obtained to support the widely accepted opinion that clonal plants may be selected with four to five times the potential productivity of the average seedling. Disease control and other cultural measures may bring ordinary seedlings up to nearly the same yield level as clonal selection. In the subsequent discussion it was generally agreed that basic research is required to clarify the criteria and results of selection.

2119 Russell, T. A.
The vigour of some cacao hybrids.
Trop. Agriculture, Trin. 1952 : **29** : 102–06.

At the Ina Cacao Farm, Nigeria, the local Amelonado selection, T 38, was crossed with each of three Trinitario trees, CF 59, CF 62 and CF 176, originating from Trinidad. The hybrids grew more vigorously than selfed Nigerian or Trinidad seedlings, and produced heavy bean yields at a much earlier age than their parents; eight years after planting, the hybrids exceeded all yield records for trees of similar age in Nigeria.

2120 Grümmer, G.
Beiträge zur Eigenschaftsanalyse der Anfälligkeit von *Papaver somniferum* gegen *Helminthosporium papaveris*. 3. Mitteilung. (**Contributions to the analysis of the character susceptibility to *H. papaveris* in *P. somniferum*. Part III**).
Züchter 1952 : **22** : 366–73.

In continuation of earlier investigations (cf. *PBA*, Vol. XXII, Absts. 2146 and 2916), attempts to estimate the strength of the toxin by its antibiotic effect on bacteria or other fungi were not successful; germination of poppy seeds was however notably retarded by a solution in which *H. Papaveris* had been cultured. The actual toxin content could be estimated by measuring the length of the roots formed after an interval of 48 hours. No differences have been observed so far between the reaction of different varieties of cultivated poppy but *P. californicum* was less retarded than *P. somniferum* and *P. setigerum*; the species *P. orientale*, *P. bracteatum*, *P. caucasicum*, *P. dubium*, *P. nudicaule* and *P. Rhoeas* were totally unaffected by the toxin, and in *P. persicum* and *P. atlanticum* it stimulated root development. Oxidation of the toxin by chemical means inactivated it.

2121 Skovsted, A.
Some colchicine experiments with hops (*Humulus*).
Hereditas, Lund 1953 : **39** : 156–60.

Diploid-tetraploid chimeras of *H. Lupulus* and *H. japonicus* were obtained as a result of colchicine treatment of the seeds. A triploid ($2n = 30$) of the former species, believed to

have resulted from the fusion of a haploid and an accidentally formed diploid gamete, also occurred in the colchicine-treated material. It was very late maturing, suggesting that tetraploid plants would also be too late to have any commercial value.

MINOR CROP PLANTS

2122 Penfold, A. R., Morrison, F. R., Willis, J. L., McKern, H. H. G. & Spies, M. C.
The occurrence of a physiological form of *Backhousia citriodora* F. Muell. and its essential oil.
J. Roy. Soc. N.S.W. 1951 : **85** : 123–26.

A new form of *B. citriodora* discovered near Miriamvale, Qd., where it grows in association with the morphologically indistinguishable type species, has essential oil comprising 62–80% l-citronellal. The oil of the type species contains 90–97% citral.

2123 Dorasami, L. S.
A brief note on areca industry in Mysore.
Mysore Agric. J. 1951 : **27** : 31–36.

During a preliminary study of strains of *Areca Catechu* cultivated in Mysore, heritable differences in size and shape of nuts, in kernel flavour and in time of maturity have been noted. A large-fruited bitter variety, Rama Adike, shows a high degree of resistance to koleroga bud rot and may be useful for breeding.

2124 Casseres, E. H. & Thomas, N. F.
Milfruto – nueva variedad de chile dulce. (**Milfruto, a new variety of sweet pepper**).
Turrialba 1952 : **2** : 113–15.

The variety Milfruto was selected at Turrialba from a local mixed variety of *Capsicum frutescens*; it bears a large number of good fruits per plant, is more suitable for cultivation in the tropics than established commercial varieties, and less susceptible to fungal attack.

2125 Hörberg, Y.
Weibulls Margo. Ny höstraps. (**Weibull's Margo. A new winter rape**).
Weibulls Ill. Årsb. 1953 : **48** : p. 33.

This new variety has done well in comparative trials at Weibullsholm and in tests at Hallandsåsen, where it surpassed all other varieties in hardiness. It has proved earlier than Matador, somewhat shorter than Regal and surpassed both in stiffness. It was obtained by selection in a stand of Matador A severely damaged by winter weather. Matador is a derivative of Lembke's winter rape.

2126 Parthasarathy, N. & Rajan, S. S.
Studies on the fertility of autotetraploids of *Brassica campestris* var. *Toria*.
Euphytica, Wageningen 1953 : **2** : 25–36.

At the Indian Agricultural Research Institute, New Delhi, attempts made to increase the fertility of colchicine-induced autotetraploids of toria by repeated selection among progenies of single plants selected for their high fertility, showed no significant results after seven years. Consequently, the method of selection was revised in the C_8 generation; seed of several superior individuals was mixed and bulked, care being taken to eliminate pollen from plants of low fertility. The immediate rise in the fertility level of the C_9 was increased by further isolation and bulking, so that the C_{10} fertility curve approximated to that of the diploids.
It is considered that seed setting was infrequent in the C_1–C_8 because adjacent plants were usually derived from the same ♀ parent and had similar self incompatibility genes; mixing the seed of élites reduced this possibility. In a cross-pollinated crop like toria, mixtures of plants with genes for high fertility permit an increase in the frequency of favourable combinations of fertility genes, which presumably have an additive effect. It is assumed that inferior genotypes will be progressively eliminated in subsequent generations bred by the revised method. Similarities between the latter and Harland's mass pedigree system (cf. *PBA*, Vol. XX, Absts. 1012 and 1013) are noted.

2127 Dionigi, A.
Il miglioramento genetico del ricino. (**The genetic improvement of the castor oil plant**).
Olearia 1949 : **3** : 179–83.

The application of the principles of genetics to the breeding of the castor oil plant is discussed, with special reference to the variety M6 bred by the author.

2128 Chouard, P.
Problèmes nouveaux et perspectives nouvelles de la culture du ricin (une nouvelle forme de liaison entre l'agriculture et l'industrie, particulièrement pour les territoires d'outremer). [**New problems and new prospects of growing the castor oil plant (a new form of liaison between agriculture and industry, particularly for the overseas territories)**].
C.R. Acad. Agri. Fr. 1953 : **39** : 82–90.

From extensive experimental farms, established

in Morocco in 1950–52 for growing the castor oil plant, it appears that, though natural selection has operated to preserve strongly rooting types, plants now segregating out range from extremely early individuals, which cannot long survive, to plants so late that flowering does not occur until the second or third year. Variation is also evident in the shape and density of the bunches and the dehiscence of the capsules. Selection and breeding for the following characteristics are necessary before attempting to extend cultivation: vigour, dense clusters of fruits, moderately late ripening, complete or almost complete absence of dehiscence, and suitability for growing as a perennial.

2129 Shimamura, T. & Kobayashi, T.
(Artificial polyploids of sesame. III).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 86–87. (Abst.). [Japanese].
Diploid and colchicine-induced tetraploid strains of black, yellow and white types of sesame were compared for three successive generations (cf. *PBA*, Vol. XXII, Abst. 1353). The fertility of the tetraploid strains remained low.

2130 Kumar, L. S. S. & Gokhale, A. V.
Natural cross pollination in *Sesamum orientale*, Linn., in the Bombay-Deccan.
Poona Agric. Coll. Mag. 1952 : **43** : 99–101.
Under conditions in the Bombay-Deccan, the extent of natural cross pollination was 14·53%. This result is compared with the percentages recorded by investigators in other parts of India.

2131 Kennerly, A. B.
Sesame! Remodeled ancient crop may challenge cotton.
Sth. Seedsman 1953 : **16** : No. 1 : 16, 88.
An account is given of progress made at the Texas Agricultural Experiment Station in sesame breeding to combine the nonshattering characteristic of an otherwise economically undesirable Venezuelan introduction and the high oil content and yield of strains adapted to cotton growing areas (Abst. 1000).

2132 Kerr, H. B.
The use of excised shoots in linseed investigations.
Proc. Linn. Soc. N.S.W. 1951 : **76** : 183–86.
A method for culturing excised shoots in order to test their reaction to races of *Melampsora Lini* is described in detail. This technique, developed at Sydney University, enables one genotype to be tested with a large number of rust races either simultaneously or consecutively, at the same time maintaining healthy parent plants.

2133 Volynec, O. S.
(Breeding results with sunflower and recent revisions of certified varieties and standards).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 3–10. [Russian].
Sunflower varieties bred recently in the USSR include VNIIMK* 8932, VNIIMK 8883 and Stavropoljskiĭ Ranniĭ 85 [Early Stavropolj 85]. They are 1–2 weeks earlier than VNIIMK 1646, carry resistance to *Orobanche*, have a high oil content, and are adapted to combine harvesting. Mention is made of another recent variety, VNIIMK 8931, which has proved, in some respects, superior to VNIIMK 6540. VNIIMK 1646, Ždanov 8281 and Saratov 169 have been improved. VNIIMK 6540, VNIIMK 1646 and Šortanda 41, which have given a good account of themselves in recent trials, were made standards in many provinces. Šortanda 41, a promising new variety, combines productiveness with earliness and has a higher oil content than Pioner Sibiri [Siberian Pioneer].

2134 Riedl, W. A., Rincker, C. M., *et al.*
Safflower variety adaptation trials in Wyoming.
Circ. Wyo. Agric. Exp. Sta. 1952 : No. 17 : Pp. 5. (Mimeographed).
Data are presented on yield of seed and oil given by ten varieties at four trial centres in 1951.

2135 **Two new safflower varieties to be in production soon.**
What's New Crops Soils 1953 : **5** : No. 5 : p. 25.
Seed of N–10 and WO–13, bred by the Western Oilseeds Company, averages 36–37% oil, outyielding the principal varieties now grown commercially in the USA by 3–4%.

2136 Deshpande, R. B.
Wild safflower (*Carthamus oxyacantha* Bieb.)—a possible oilseed crop for the desert and arid regions.
Indian J. Genet. 1952 : **12** : 10–14.
The botanical characters and uses of *C. Oxyacantha* ($2n = 24$) are described. Its oil content

* Vsesojuznyĭ Naučno-Issledovateljskiĭ Institut Masličnyh Kuljtur [USSR Scientific Research Institute of Oil Plants].

was found to be 27·2%. In crosses with *C. tinctorius* ($2n = 24$), yellow petal colour was dominant to white or cream, and red dominant to yellow; the spiny condition of *C. Oxyacantha* was partially dominant.

2137 Préaud, R.
La recherche agronomique et les oléagineux tropicaux. (**Agronomic research and tropical oil plants**).
Oléagineux, Paris 1953 : **8** : 1–7.

Mention is made of the improvement achieved in the yield of the oil palm by selection and breeding at the African research stations of the French Research Institute for Oils and Oil plants. From 1953 onwards, the above Institute, in conjunction with research institutions in British Malaya and the Belgian Congo, will exchange: (1) seed of the best lines, to determine their adaptation to different soils and climates; (2) pollen of various origins for hybridization of the best plants of each region; and (3) nuts from crowns thus artificially pollinated.
Aims in groundnut breeding are increased yield and resistance to rosette. Larroque's method has been adopted for oil crops by the institute to hasten the initial stage of mass selection (cf. *PBA*, Vol. XIX, Absts. 3 and 1994, and Vol. XX, Abst. 2539).

2138 Vanderweyen, R.
La prospection des palmeraies congolaises et ses premiers résultats. (**Surveying the Congo palm stands. Initial results**).
Bull. Inform. INEAC 1952 : **1** : 357–82.

The criteria used in marking promising trees in wild, semiwild or self-sown and artificially established palm stands are set out, with some notes on the characteristics, yield and quality of selected trees of the *tenera* and *dura* types. Selfing and hybridization of promising mother trees will be undertaken.

2139 Vanderweyen, R.
Comment déterminer la richesse en huile des fruits ou des régimes d'une palmeraie? (**How shall we determine the oil content of fruits or crowns in a palm plantation ?**)
Bull. Inform. INEAC 1953 : **2** : 31–50.

Sampling and analysis are described in their application to (1) young stands that have just come into bearing; (2) adult stands whose replacement is contemplated; and (3) fruits delivered by native workers at the commercial centre of an oil factory.

2140 de Blank, S.
A reconnaissance of the American oil palm.
Trop. Agriculture, Trin. 1952 : **29** : 90–101.

A survey of *Elaeis melanococca* (= *Corozo oleifera*) in Brazil, Panama, the Canal Zone, Costa Rica, Colombia and Surinam, has shown that growth habit, frond formation and characteristics of the inflorescence and fruit are uniform over a wide area. No evidence of natural inter-specific hybridization was found where *E. guineensis* had been introduced. *E. melanococca* is particularly notable for its short trunk, which makes the fruit easily accessible, and for the high oil/bunch ratio; it is also free from diseases to which *E. guineensis* is subject. An investigation into the possibility of producing interspecific hybrids combining these desirable qualities with the high yielding ability of *E. guineensis* is therefore considered justifiable.

2141 Berger, C. A., LaFleur, A. L. & Witkus, E. R.
C-mitosis in *Commelina communis* L.
J. Hered. 1952 : **43** : 243–47.

A chromosome number of $2n = 90$ is reported for *C. communis*. Treatment of root tips with 1·0 or 0·1% colchicine solution resulted in an exploded type of mitosis in some cells.

2142 Toxopeus, H. J.
Over de betekenis van het verdubbelen van het aantal chromosomen voor de veredeling van geneeskrachtige en aromatische gewassen. (**On the importance of doubling of the chromosome number for breeding medicinal and aromatic plants**).
Herba 1952 : **11** : No. 2 : 1–11.

A review is given of previous work on the possibility of increasing the alkaloid content of *Lobelia* and *Datura* by chromosome doubling and on the rubber content of tetraploid *Taraxacum Kok-saghyz*. In the author's opinion, the results obtained with artificially induced tetraploids of red clover, rye and sugar beet are disappointing owing to the defects that appear when these crops are grown on a large scale. As medicinal and aromatic plants are usually grown on a smaller scale, better results might be obtained by the use of tetraploids. Selection of diploid material would, however, be necessary first, and, as tetraploids from different varieties differ in their breeding behaviour, many varieties should be used in the production of the initial tetraploid material.

A list is given of the chromosome numbers of a series of medicinal plants and related species.

2143 Froeschel, P. & Claeys, R.
Création des formes polyploïdes des plantes médicinales. (**The production of polyploid forms of medicinal plants**).
J. Pharm. Belg. 1949 : **4** : 241–50.

Data are provided on the total number of polyploids obtained and their morphological characters for a series of medicinal plants treated with colchicine. The species investigated were *Datura Stramonium, Althaea officinalis, Digitalis purpurea, Atropa Belladonna, Hyoscyamus niger, Valeriana officinalis, Angelica Archangelica* and *Anthemis nobilis.*

2144 Vollema, J. S.
Jeugdselectie bij *Hevea.* (**Early selection in *Hevea***).
Arch. Rubbercult. Ned.-Ind 1952 : **29** : 31–63.

Early examination for growth, when carried out in the field, should lead to the identification of the seedlings which at tappable age will be larger than unselected seedlings. This is not so in the case of nursery selection.
Experiments on the effectiveness of the prick test (which includes "Testatex" tapping) are also discussed.
Early tapping of seedlings at the age of 3–4 years in the field offered no practical basis for mother tree selection.

2145 Evers, E.
La présélection des semenceaux en hévéaculture. (**Preselection of seedlings in rubber growing**).
Bull. Agric. Congo Belge 1952 : **1** : 145–90.

This article instructs the planter about the relative value of grafts and seedlings, and also the results to be expected from the use of seedlings, preselected by tests for vigour and yield, in order to obtain potentially high yielding trees that will come into bearing early.

2146 **Hand pollination in *Hevea brasiliensis*.**
R.R.I. Plant. Bull. 1953 : N.S. No. 5 : 29–34.

A detailed and well-illustrated account is provided of the technique of hand pollination.

2147 Constable, D. H. & Silva, C. A. de.
Clonal yield maps for rubber in Ceylon.
Quart. Circ. Ceylon Rubb. Res. Inst. 1952 : Nos. 1 and 2 : 15–25.

Maps are given showing the yield classes for full size plantings of clones tested in various areas (cf. Abst. 1410).

2148 Ferwerda, F. P.
A possible explanation of the divergence between juvenile type budgrafts and their seedling mother trees in *Hevea.*
Euphytica, Wageningen 1953 : **2** : 15–24.

Yield data and girth measurements from selected rubber seedlings and plants produced by grafting buds from these seedlings on unselected stocks of the same age in Java have shown that the budded plants lag behind genetically identical seedlings during the first five years. This lag, attributed to the influence of unselected stocks, was most pronounced in scions taken from seedlings of the highest yielding ability, frequently grafted on stocks incapable of allowing a good flow of latex. Breeding and clonal selection, previously restricted to the improvement of the scion, are consequently being carried out with respect to stock improvement, so that the vigour and yield of superior scions may be fully expressed.

2149 **Prang Besar 86 as a seed parent.**
R.R.I. Plant. Bull. 1953 : N.S. No. 5 : 42–46.

Progenies from crosses involving the highly fertile clone PB 86 are below the average in respect of yield and vigour. Yellow-leaved seedlings, developing into inferior trees, occur among the progenies of certain crosses. No seed should be planted which comprises over 15–20% mother seed of PB 86.

2150 Gorenz, A. M.
***Diplodia* infection of *Hevea* buddings and its prevention by the use of a protective fungicide.**
Circ. US Dep. Agric. 1953 : No. 913 : Pp. 22.

During investigations at the Mexico Rubber Experiment Station, Veracruz, it was noted that three unnamed seedlings used as scions were more resistant to *Diplodia Theobromae* than scions taken from four clones, FB 409, FB 1619, FB 1620 and FB 3363, commonly used because of their resistance to South American leaf blight (*Dothidella Ulei*).

2151 Belikov, P. S.
(**Changes in the synthesis of rubber by kok saghyz related to the age of the plants**).
Trud. Inst. Fiziol. Rast. Timirjazeva (Trans. Timirjazev. Inst. Pl. Physiol.), Moskva 1949 : **6** : 63–69. [Russian].

Breeding types that do not flower in the first year is advocated on the basis of yield analyses

of some plants of varieties M–485 and K that completed their growth cycles in 1 or 2 years.

FRUITS AND NUTS

2152 GRANHALL, I.
Berättelse över verksamheten vid Balsgård år 1951. (**Report on the work at Balsgård in 1951**).
Fören. Växtföräd. Fruktträd 1951 (1952) : Pp. 16.

In addition to large scale artificial pollinations of pome and stone fruits and of hazels (cf. Abst. 600), breeding material was tested in the low temperature laboratory and the storage plant.
Studies on induction of mutation in apples, pears, plums and cherries included treatment with X rays, neutrons and radioactive phosphorus and sulphur. Previous X-irradiation had produced about 10 mutations affecting fruit colour or the chlorophyll of the leaf.

Apple. Most of the crosses made were between diploids, the aims being the production of (*a*) hardy and late ripening varieties; (*b*) extremely early varieties; and (*c*) varieties for export. Back crosses of various hybrid progenies such as Boiken x Cox's Orange, Ontario x Filippa and Encore x James Grieve were made.
In the diploid x tetraploid group James Grieve, Gul Richard [Yellow Richard] and Boiken were among the varieties pollinated by McIntosh pollen flown from the New Jersey Agricultural Experiment Station, USA. In exchange, pollen from Balsgård tetraploids was sent to Purdue University and the New Brunswick Station for a series of crosses to obtain scab resistant breeding material.
East Malling stocks have been crossed with the Alnarp clone A_2 to obtain a type like EM IV without its defects.
Studies of vitamin C content, cold resistance and cooking qualities were also carried out on older material.

Pear. Most of the material crossed was from the Balsgård collection. To obtain late varieties with good storage properties, Olivier de Serres, Worden Seckel, Conference and Williams were crossed with the Johantorp pear, while better early types were the object of crosses of Laxton's Early Market with Colorée de Juillet and Esperens Herre.
It is hoped to obtain new triploids from the cross Tetraploid Fertility x Soldat Laboureur.
Aronia, *Amelanchier* and *Crataegus* species and some quinces are under observation as possible pear stocks.

Plum. Early plums of good quality and hardy early or medium late varieties are the aims in breeding. Hardy plums of the *Prunus domestica* type have been crossed with high quality varieties.
Some diploid plums have also been used in exploratory crosses.

Cherry. The required types are yellow or yellowish red, early ripening cherries and late varieties resistant to bacterial infection. An attempt to improve the hardiness of the sour cherry has been made by crossing the Canadian Vladimir 0–241 with Triaux.

Peach. Crosses have been made between early ripening and high quality peaches to improve the quality of the early varieties and, if possible, the resistance to cold.

Hazel. Resistance to cold and good quality are the desiderata in hazel breeding and types that have withstood freezing tests successfully have been crossed with varieties with large nuts, e.g. Tidig Lång Zeller [Early Long Zeller], Cosford and Lambert Filbert.
In a wind break of hazels raised from nuts of trees that had withstood the severe winters during 1940–47, great variation in quality and size of nuts and in productivity and hardiness has been observed.

2153 DARROW, G. M.
Breeding of small fruits in the United States.
Sci. Mon., Lond. 1952 : **75** : 288–97.

A detailed review is given of the history, methods, varieties produced and future prospects of breeding projects in the USA concerned with blackberries, raspberries, strawberries, blueberries, cranberries and grapes.

2154 VALDEYRON, G. & CROSSA-RAYNAUD, P.
Les fruits de Tunisie. (**The fruits of Tunisia**).
Ann. Serv. Bot. Tunis. 1950 : **23** : 1–124.

Part I of this publication reviews and discusses the main species and varieties of fruit trees grown in Tunisia without irrigation. Separate sections are included dealing with olives for the table and for oil production, and with the almond and the apricot, while pears, apples and figs are more briefly treated in a single chapter. Black-and-white illustrations and some handsome coloured plates illustrate the text.
Part II provides a classified and annotated index of the varieties of different fruit trees in the collection of the Botanical and Agronomic Service of Tunis. The varieties are alphabetically arranged within their group.

2155 Chevalier, A.
Réflexions sur l'avenir de la culture des arbres fruitiers du groupe des Pomacées et sur les possibilités de leur amélioration. (**Reflexions on the future of the cultivation of the fruit trees of the group Pomaceae and on the possibility of improving them**).
Rev. Int. Bot. Appl. 1952 : **32** : 533–47.

The writer discusses the above problem in the light of existing records and his own observations concerning the following questions: incompatibility in the apple, pear and quince and the reputed existence of sexual hybrids between pear and apple; sexual hybrids of pears and quinces, *Eupyrus* and *Aria*, and also of *Eupyrus* and *Malus*; graft hybrids and chimeras in the Pomaceae and difficulties of grafting pear and apple; the taxonomic subdivisions of *Pyrus* according to de Candolle and the characters of the subspecies of the genus; and the effects of sexual hybridization and grafting on the vine.

2156 Leplinskaja, A. A.
(**Early varieties of apple in Uzbekistan**).
Sad i Ogorod (Fruit & Vegetable Gardens) 1952 : No. 12 : 26–27. [Russian].

Several early apples, bred at the Samarkand Breeding Station, are described. Kaljvilj Rozovyi [Pink Calville] from Kaljvilj Belyĭ Zimniĭ [White Winter Calville] x Samarkandskoe Rannee [Early Samarkand], combines the earliness of the local form with the good quality of the maternal parent.
Pervenec Samarkanda 102 [Samarkand Firstborn 102], Afrosiabi 30, Zeravšanskaja Rozovka 6 [Pink Zeravšanskaja 6], Registani 75 and Saratoni 175 were bred from Landsberger Reinette x Samarkandskoe Rannee. Pervenec Samarkanda reaches maturity in June and the other varieties in July. The quality of the fruit is good. Some of the varieties are interesting because of their transportability.

2157 Granhall, I.
X-ray mutations in apples and pears.
Hereditas, Lund 1953 : **39** : 149–55.

The following X-ray-induced mutants are described: green and yellow striations of the fruits of the pear Esperens Herre (= Belle Lucrative); brown-russeted fruits of this pear variety; chlorophyll deficiency in the foliage of a form of the Williams pear; and three types of red fruit in the apple Gravenstein. The mutants are sectorial chimeras; whether they are also periclinal chimeras has still to be investigated.

2158 Carlone, R.
Caratteristiche botaniche e struttura delle radici di piante di melo della varietà "Firminello" nate da seme. (**Botanical characteristics and root structure of plants of the apple variety Firminello derived from seeds**).
Ann. Sper. Agr. 1953 : **7** : 289–98.

The variety, which is hardy and disease resistant but poor in fruit quality, is self sterile; its seeds give rise to seedlings of three distinct types, corresponding respectively to vigorous, medium and dwarfing stocks, which are described, with details of their external characteristics and the anatomical features of their roots. Careful selection according to type is necessary before using these seedlings as rootstocks.

2159 Schneider, G. W.
Megagametogenesis and embryology in a diploid and an aneuploid apple.
Amer. J. Bot. 1953 : **40** : 196–203.

A comparison made between New Jersey 4 ($2n = 44 \pm 1$), derived from a cross between the triploid parents Red Gravenstein and Close, and the diploid Jonathan ($2n = 34$), has shown that normal functional megaspores are formed by both varieties. New Jersey 4, however, frequently developed supernumerary megaspore mother cells; these were less common in Jonathan. In the supernumerary archesporia certain cells often became packed with dense cytoplasm; subsequent proliferation of these anomalous cells caused destruction of the embryos. Abscission of most of the young fruits containing anomalous cells occurred within 10 days of pollination. New Jersey 4 fruits without anomalous cells developed normally for a short time after fertilization, but a large proportion of the young embryos soon aborted because their genetic composition was unbalanced. Such abortion was not found in Jonathan.

2160 Rudloff, C. F. & Schmidt, M.
Untersuchungen über Kernzahl und Fruchtgewicht und deren gegenseitige Beziehungen bei einigen Apfelsorten. (**Investigations on number of seeds and fruit weight and their mutual relationship in certain apple varieties**).
Züchter 1953 : **23** : 44–61.

Although most of the triploid varieties examined had a large proportion of imperfectly developed seeds, some exceptions were observed, such as the variety Roter Eiserapfel with only 13%,

and some diploid varieties had a higher proportion, such as 24–30% in Cox's Orange, and 29% in Croncels. Some varieties varied widely from year to year, both in respect of the number of imperfect seeds and the average number of seeds per fruit; the triploids in general had lower average numbers than the diploids. Data for fruit weight failed to show a correlation between this and seed number as between varieties; within the variety only a slight positive correlation usually existed and in some varieties it was even negative.

2161 Belohonov, I. V.
(Apply the achievements of Mičurinite research to practical horticulture).
Priroda (Nature) 1953 : No. 2 : 56–61. [Russian].

The following apples have been recently developed at the Mičurin Horticultural Institute and its various branch research stations.
Papirovka Rannjaja [Early Papirovka], Grušovka Rannjaja [Early Pear], Junyĭ Mičurinec [Young Mičurinite], Narodnoe [People's] and Krasavica Sada [Orchard Beauty] are more productive and 7–10 days earlier than other summer varieties. They produce large fruits of good quality.
Sinap Severnyĭ [Northern Sinap], Pamjatj Mičurina [Mičurin's Memorial], Pobeditelj [Victor], Zimnee Prevoshodnoe [Excellent Winter] and Ivanovka are winter varieties adapted to the climate of central Russia. They reach maturity later than Antonovka and their fruits have good keeping properties.
Renetka Purpurovaja [Purple Reinette], Sibirskoe Zoloto [Siberian Gold], Ljubimec Nikiforova [Nikiforov's Favourite], Kitaĭka Saninskaja [Sanin's Chinese Crab], Kitaĭka Temnokrasnaja Pozdnjaja [Late Red Chinese Crab] and Sejanec Kravčenko [Kravčenko's Seedling] are hardy under the severe Siberian conditions.

2162 Zwintzscher, M.
Selectie van schurftresistente fruitrassen. **(Breeding scab resistant varieties of fruit).**
Fruitteelt 1952 : 973–74.

A review is given of the lines of research followed in Germany for the last 25 years. Though no resistant apple variety has yet been produced, the results obtained are of value for future studies.

2163 Termohlen, G. P.
Schurftresistentie van appel. **(Scab resistance of apples).**
Fruitteelt 1952 : 965–67.

In considering the problem of how new resistant varieties might be bred, the writer favours the method of crossing a cultivated variety with a resistant wild one, followed by repeated backcrossing to the cultivated parent until a type combining the characteristics of the cultivated parent with resistance is obtained.
The proper method of infection and the possibility of the occurrence of new forms of the fungus are also discussed.

2164 den Boer, A. F. & Collins, W. H.
Apple scab resistance in ornamental crab apples.
Trans. Iowa Hort. Soc. 1951 : **86** : 44–64.

The value of crab forms in breeding apple varieties resistant to scab is discussed. The results of a survey of a large collection of crab apples at Des Moines in Iowa for incidence of scab and fire blight are tabulated. A report of an interstate project of breeding scab resistant apples, using *Malus* spp., is also given (cf. *PBA*, Vol. XXII, Abst. 2553).

2165 Siĭman, A. M.
(Horticulturist-Mičurinites of the Estonian SSR).
Sad i Ogorod (Fruit & Vegetable Gardens) 1952 : No. 12 : 31–32. [Russian].

Promising new hardy pears and plums have been selected from local material in Estonia. Pear seedling 5 produces medium large fruits suitable for processing. It reaches maturity in mid-September. A seedling of the hybrid Curé x Napoleon has large greenish yellow fruits with flesh of good flavour. Bergamotte Kjagi is notable for its productiveness and makes good rootstocks for pears.
Plum seedling 1 produces large attractive pink fruits which reach ripeness in August. The quality and transportability of the fruits are good. Seedling 2 has large yellow fruits with a bloom. Their flavour is good.

2166 Stanton, W. R.
Breeding pears for resistance to the pear scab fungus *Venturia pirina* Aderh. I. Variation in the pathogenicity of *Venturia pirina*.
Ann. Appl. Biol. 1953 : **40** : 184–91.

Following a preliminary analysis of the reactions of 40 pear varieties to 3 strains of *V. pirina*, 12 varieties grown commercially in England were selected for demonstrating the degree of pathogenicity of 16 isolates of the fungus. Four main groups of biotypes were differentiated. Most isolates from the resistant Conference had a narrow host range, but K^1 attacked 6 of the most commonly grown pears. Although no

variety was immune from all isolates, Beurré Giffard was resistant to 15.

2167 Stanton, W. R.
Breeding pears for resistance to the pear scab fungus, *Venturia pirina* Aderh. II. The study of field resistance on selected pear seedlings and the inheritance of resistance in seedling pear families under controlled conditions.
Ann. Appl. Biol. 1953 : **40** : 192–96.

Clonal isolates of *V. pirina* differing in range of pathogenicity were used to inoculate (i) field-resistant seedling selections from Buerré Giffard x Conference and Buerré Giffard x Fertility and (ii) whole families of two crosses between field-resistant and field-susceptible varieties, namely Comice x Buerré Giffard and Conference x Fertility. In (i) some seedlings proved to be susceptible to certain isolates. Segregation for susceptibility in (ii) varied with different biotypes. Resistance to each isolate, however, appeared to be dominant to susceptibility. It was noted that in general isolates from the parents caused more severe symptoms than isolates from unrelated varieties.

2168 Metlickiĭ, Z. A.
(The principal questions concerning quince cultivation).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 1 : 32–35. [Russian].

Promising forms of quinces have been selected from local material in the Crimean, Herson, Astrahanj and Grozno provinces, the Krasnodar territory and Dagestan, Georgia and Moldavia.

2169 Gorin, T. I.
(Quinces in the Lower Volga Basin).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 1 : 35–39. [Russian].

Skorospelka [Early], Maslenka Rannjaja [Early Butter], Maslenka Pozdnjaja [Late Butter], Zimovka [Winter] and Obratnogruševidnaja [Inverted Pear] have been recently developed in the Astrahanj and Stalingrad provinces. They are hardy, and bear good quality fruits. Maslenka Rannjaja and Obratnogruševidnaja produce large fruits weighing 200–250 grm. each. They will keep till April.

2170 Motovilov, B. A.
(New varieties of apricot for the steppe districts of Kubanj).
Sad i Ogorod (Fruit & Vegetable Gardens) 1952 : No. 11 : 26–27. [Russian].

Several hardy and productive forms of apricot were selected from local material in Krasnodar. Crosses between these and Krasnoščekiĭ [Red Cheek] have given the new varieties Sjurpriz [Surprise], Rumjanyĭ [Rosy] and Rubinovyĭ [Ruby], which combine hardiness with good fruit quality. They are annual bearers and reach maturity in July. Rubinovyĭ shows resistance to blossom wilt and spur blight.

2171 Nagai, T. & Shibamoto, K.
(On wild peaches in the Ina district).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1952 : **21** : 104–06. [Japanese].

Descriptions are given of samples of wild peach collected in the above district of the Nagano prefecture. Data are given on vegetative period, the morphology and colour of the flower, size and shape of the fruit, colour and thickness of flesh, morphology of the stone, and resistance to pests. The fruits of the wild forms were much inferior to those of cultivated varieties.

2172 Hesse, C. O. & Thompson, L. A.
Ten peaches and a nectarine for the western states.
Circ. U.S. Dep. Agric. 1951 : No. 885 : Pp. 34.

Descriptions are given of ten peach varieties and one nectarine, the majority of which were released in the early 'forties.

2173 *Čerevatenko, A. S.
(New varieties of peach in Uzbekistan).
Sad i Ogorod (Fruit & Vegetable Gardens) 1952 : No. 12 : 28–31. [Russian].

Start 1390, Lola 1409 [Tulip 1409], Malinovyĭ 984 [Raspberry 984], Vladimir 1001, Krasnovostočnyĭ 1894 [Red East 1894], Zafar 1267, Širin 1024, Farhad 1249 and Vatan have been recently bred at Samarkand. They are productive and hardier than Elberta. The quality of the fruit, particularly of Širin 1024, from Elberta x Inžirnyĭ [Fig], and Farhad 1249, from Naridži Pozdniĭ [Late Naridži] x Elberta, is good. The former reaches maturity in the first and the latter in the second week of September.

2174 Mamporija, F. D.
(Vegetative hybridization of citrus fruits).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1952 : No. 6 : 49–61. [Russian].

At Suhumi, vegetative and sexual progenies of chimeras of various citrus fruits have been

* An extended summary of this paper is on file at the Bureau.

investigated. Some individuals in the sexual progeny of a periclinal chimera between *Poncirus trifoliata* and the Unshu (= Satsuma) mandarin combined the characters of both components. The Mičurinite views on vegetative hybridization are expounded.

2175 Deaker, E. M.
Comparison of the ascorbic acid content of Meyer and standard types of lemons.
N.Z. J. Sci. Tech. 1952 : **34** : 146–49.

Results of juice analyses carried out on behalf of the New Zealand Department of Agriculture have shown that the Meyer lemon has a lower ascorbic acid content per unit volume of juice than standard varieties such as Lisbon, Eureka, Genoa and Villa Franca. With respect to ascorbic acid content per lemon, however, no significant differences were noted between standard varieties and the Meyer lemon, as the latter contains more juice than the standards.

2176 Perišić, M. M.
(A study of mosaic on fig trees in the Montenegrin Littoral).
God. Poljoprivredn. Fak. (Yearb. Agric. Fac.), Beograd 1952 : No. 4 : 229–34. [Serbian].

At the Topolica Institute of Adriatic Plants, Bar, the fig varieties Džonkula, Carigradska Smokva [Istanbul Fig], Biejela Sultanija [White Sultana], Zimnica Tip Cr.3 [Winter type Cr.3], Bujaka Crna [Lush Black] and Crna Petrovača [Petrovač Black] showed the highest degree of resistance to mosaic.

2177 Caresche, L.
La production de la soie grège au Japon. **(The production of raw silk in Japan).**
Agron. Trop., Nogent 1952 : **7** : 373–82.

The mulberry varieties in Japan include almost all known species in the world, but the varieties grown for silkworm culture belong chiefly to *Morus Bombycis, M. alba* and *M. multicaulis*. In breeding for regionally adapted trees meeting the various requirements in silkworm rearing, selection among seedlings or wild types has been tried, and a search has been made for mutations, but hybridization has proved the most promising method. Some natural triploid varieties ($2n = 42$) have been identified; a triploid superior in yield to its parents—a tetraploid and a diploid variety—has been obtained by crossing. Most triploids have infertile seed.
No correlation has been found between chromosome number and parthenocarpy.

2178 Leroy, J. -F.
Les *Juglandicarya* de l'Eocène inférieur et l'*Annamocarya* actuel. **(The *Juglandicarya* of the Lower Eocene and the *Annamocarya* of the present day).**
Rev. Int. Bot. Appl. 1952 : **32** : 586–87.

The writer disagrees with the suggestion of Hu Hsen-Hsu that *Annamocarya sinensis* (Dode) J. F. Ler. should be relegated to *Juglandicarya* Reid and Chandler of the London Clay flora (cf. *PBA*, Vol. XXI, Abst. 1337).

2179 Golikov, A. I.
(Forms of walnut in the Soči-Tuapse district and principles for their selection).
Lesnoe Hozjaĭstvo (Forestry) 1952 : No. 1 : 62–66. [Russian].

Many promising forms, including trees 4 and 27 which are briefly described, have been selected from the local material. Selections were made for superior combinations in respect of the following characters: nut and kernel weights, kernel extraction, shell thickness, oil content, crackability, viability, readily detachable kernel and flavour. Tree 4 produces fruits which weigh 8 grm. each. Their shells can be cracked and the kernels extracted with ease. The kernel content is 52·8% and oil extraction 68·33%. Tree 27 produces larger fruits with a slightly smaller kernel and a higher oil content.

2180 Evreinoff, V. A.
Quelques observations biologiques sur l'amandier. **(Some biological observations on the almond).**
Rev. Int. Bot. Appl. 1952 : **32** : 442–59.

The area of distribution and the hybrid and complex origin of the cultivated almond are discussed, with notes on flowering, pollination, multiplication and the different varieties and types of almond. American work on the genetic relationship between the bitter and the sweet almond is cited.

2181 Chevalier, A.
Vrais et faux pistachiers. **(True and false pistachios).**
Rev. Int. Bot. Appl. 1952 : **32** : 491–94.

The identity and area of distribution of species of *Pistacia* are briefly considered, *P. vera* receiving special attention.

2182 Kalmykov, S. S.
(The pistachios of Kazahstan, untapped resources of natural wealth).
Lesnoe Hozjaĭstvo (Forestry) 1952 : No. 2 : 49–53. [Russian].

Several promising forms have been selected from wild local material. Many of them have

the important character of dehiscent fruit. Forms 4 and 60a, with 100% dehiscent fruits, are the most interesting in this respect. Form 6a produces the largest fruits and form 8 those with the highest percentage of kernel. All the selected forms were inferior to pistachios from Persia and Azerbaĭdžan in respect of fruit size, but were hardier.

2183 Kumazawa, S. & Nishimura, S.
(Classification of groundnut varieties).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1952 : **21** : 65–72. [Japanese].

A series of Japanese, east Asiatic and American groundnut varieties are classified into groups on the basis of the following characters: morphology and dimensions of the stem, leaf, fruit and seed, vegetative period and disease resistance.

2184 Bousquet, M.
Le Sine-Saloum agricole. **(Agriculture in Sine-Saloum).**
Agron. Trop., Nogent 1952 : **7** : 233–65.

Measures for preventing soil deterioration in Sine-Saloum, Senegal, include the cultivation of groundnuts, of which a number of different types have evolved as a result of natural selection in ecologically different parts of the region. It has also been observed that, passing from the north to south of the district, the plants tend to have increasingly larger pods and thicker shells. At the Bambey Research Station, these ecologically conditioned differences have been used to determine the range of adaptation of the pure lines 24–48, 24–11 and 28–206 obtained by artificial selection.
Future plans for breeding and selection and present methods of pure seed production are briefly indicated.

2185 de Capite, L.
Le principali varietà di olivo e la loro distribuzione geografica nella Catalogna. **(The main olive varieties and their geographical distribution in Catalunia).**
Ann. Fac. Agr. Perugia 1950 : **7** : 210–23.

A brief history of olive cultivation in Catalunia from Roman times to the present day is followed by descriptions of the chief varieties grown, with indications of certain synonyms, and of their distribution.

2186 Castorina, S.
La varietà e la resa in olio della oliva. **(Variety and oil yield in the olive).**
Olearia 1949 : **3** : 88–90.

Oil content, percentage extract and total yield are reported for 6 varieties studied at the Olive Experimental Station at Pescara.

2187 Hofmeyr, J. D. J.
Sex reversal as a means of solving breeding problems of *Carica Papaya*, L.
S. Afr. J. Sci. 1953 : **49** : 228–32.

Sex reversal in flowers of male (M_1m) and female (mm) trees (cf. *PBA*, Vol. IX, Abst. 85 and Vol. X, Abst. 654) is due to recessive modifying genes. The modifiers causing a change from maleness to femaleness are probably genetically different from those responsible for an alteration from femaleness to maleness. Since sex reversal permits self pollination, it makes possible a reduction in the duration of the inbreeding programme to 12 years, instead of the 36 years required with brother-sister mating. Inbreeding should finally provide two types of superior lines: those showing sex reversal in their female progeny and those producing normal females. Combination of these two types of females in crosses should give high yielding, uniform and 100% female progenies. For crop production, 5% male trees would be necessary as pollinators.

2188 Chevalier, A.
Les jujubiers ou *Ziziphus* du Sahara. **(Jujubes or *Ziziphus* of the Sahara).**
Rev. Int. Bot. Appl. 1952 : **32** : 574–77.

Taxonomic and ecological notes are recorded on species of *Ziziphus* observed in the Sahara by the author during his African tour.

2189 Heslop-Harrison, Y.
Cytological studies in the genus *Rubus* L. I. Chromosome numbers in the British *Rubus* flora.
New Phytol. 1953 : **52** : 22–39.

The results of 217 chromosome determinations of British taxa are presented; these include counts reported for the first time from 80 euploid taxa. Agreement is found between the distribution of cytotypes of the section *Moriferi* in Sweden and the British Isles; in Britain 90·7% of the taxa are tetraploid. In the subsection *Corylifolii*, however, the cytotype distribution differs considerably in the two countries. The cytological heterogeneity believed to be characteristic of some 20 taxa is discussed, with reference to the following: inconsistencies between determinations in a complex taxonomic group with very small chromosomes; the possibility that still further units remain to be distinguished within recognized taxa; and the occurrence of haploid aberrants due to the parthenogenetic development of reduced ♀ gametes. The author considers that intrataxic heteroploidy may not indeed occur.

Data from a cytological study of 7 microphyllous taxa suggest that the dwarfed condition is controlled by a genetic factor in the normal chromosome complement and is not the result of monosomy (cf. *PBA*, Vol. X, Abst. 969). Microphyllous monosomics are probably eliminated in nature because of reduced viability.

2190 Beijerinck, W.
On the habit, ecology and taxonomy of the brambles of the Netherlands.
Acta Bot. Neerl. 1953 : **1** : 523–45.

Interrelationships between the genotype and environment are briefly discussed with reference to growth habit. A number of morphological and ecological characteristics of importance for distinguishing species and intraspecific taxa are described in detail. Various attempts to classify the genus *Rubus* are surveyed, special attention being given to those taxonomic units occurring in the Netherlands.

2191 Kronenberg, H. G.
Veredeling van kleinfruit in de Verenigde Staten van Amerika. (**Small fruit breeding in the USA**).
Meded. Dir. Tuinb. 1953 : **16** : 39–52, 105–13.

This survey deals with strawberry, raspberry and blackberry breeding (cf. *PBA*, Vol. XIX, Abst. 2084).

2192 Bois, E.
Le framboisier Romy. (**The raspberry Romy**).
Rev. Hort. Suisse 1953 : **26** : 68–70.

This new variety from Geneva is a seedling resulting from several unspecified crosses. The deep red, scented fruits, which are easily detached, are conical and obtuse, shiny, and with fine hairs. The first crop is ready on 18–20 June and the second at the end of August. The latter crop yields up to 300 fruits per cane. Resistance to disease and to night frosts, even with temperatures as low as −3° in mid-November, is good.

2193 **New blueberries, strawberry, blackberry ready for Jersey.**
N.J. Agric. 1952 : **34** : No. 6 : p. 4.

Three blueberries, Earliblue, Bluecrop and Herbert, maturing in June, midseason and late summer, respectively, have been released jointly by the New Jersey Experiment Station and the US Department of Agriculture. All three have large firm berries of superior quality and flavour; Bluecrop is also very productive. Descriptions of a new blackberry, NJ 16, and strawberry, NJ 7A, are included (cf. Abst. 1460).

2194 ter Pelkwijk, A. J.
The chromosome-number of *Amelanchier laevis* Wieg. forma *villosa* ter Pelkwijk.
Genetica 1951 : **25** : 519–21.

Root tip counts have shown that this plant, occurring as an escape in the Netherlands, is a tetraploid ($2n = 68$). Since *A. laevis* is also a tetraploid, it is probable that *A. laevis* f. *villosa* is a local variation and not a hybrid, as the percentage fertility is high and progenies are homogeneous.

2195 Hylmö, B.
Gammal jordgubbe med nytt namn. (**An old strawberry with a new name**).
Fruktodlaren 1953 : No. 1 : 21–22.

Thörnblad, R.
Gammal jordgubbe med nytt namn. (**An old strawberry with a new name**).
Ibid. 1953 : No. 2 : 45–46.

The writer of the first article thinks that the names Missionär [Missionary], Eklatant [Éclatant] and the allegedly new variety Mannevik are synonyms and that the American name Missionary may possibly also be another.
The author of the second paper rejects B. Hylmö's strictures on the claims made for separate identity of the strawberry Mannevik, and advances evidence to show that Mannevik is in fact a new variety.

2196 Hanson, K. W.
The inbreeding and outbreeding behavior of certain strawberry clones with respect to ascorbic acid content of the fruit and fruit size.
Diss. Abstr. 1952 : **12** : Publ. No. 3408 : 292–93. (Abst.).

In the first experiment the varieties Marshall and Dunlap and inbred clones derived from both of these varieties were all selfed and top-crossed to Premier. In the second, four inbred clones originating from Chaska, Duluth, Early Bird and Marshall, respectively, were intercrossed in all possible combinations. The parent clones in both tests had been selected for plant and fruit characters, but not for ascorbic acid content.
In the first experiment, five of the nine inbreds had higher means for ascorbic acid control than the related variety. Top-cross data indicated that two of the inbreds had significantly better combining ability for this character than the related variety. Premier had a depressing effect upon ascorbic acid content, the selfed progenies having higher means than the top

crosses. Means of selfs and top crosses were highly correlated (+ 0·83). All the parents showed relatiyely good combining ability for fruit size. The mean weight of fruit was 46% greater in the top crosses than in the selfs.
The single crosses in the second experiment showed highly significant differences for ascorbic acid content. Three of the four parents transmitted the character of high ascorbic acid content; the cross between inbreds of Marshall and Early Bird gave the highest progeny mean, 134·5 mgm. per 100 grm. In both experiments, no general relationship could be found between fruit size and ascorbic acid content.

2197 Staudt, G.
Zur Selbststerilität von *Fragaria viridis* Duch. (Self sterility of *F. viridis* Duch.).
Naturwissenschaften 1952 : **39** : 572–73.

Self pollination of 23 lines of *F. viridis* of varied provenance showed them all to be completely self sterile, though they were fully fertile when interpollinated. The self sterility resulted from delayed growth of the pollen tubes.
F_1 plants from intercrossing two clones were fertile with either of the parent clones but on selfing gave only 0·03% seed set. Intercrossing of F_1 plants revealed both fertile and sterile combinations.

2198 Dahlgren, K. V. O.
Die eigenartigen Vererbungsverhältnisse der *micrantha*-Form von *Fragaria vesca*. (The peculiar conditions of inheritance of the *micrantha* form of *F. vesca*).
Svensk. Bot. Tidskr. 1953 : **47** : 1–15.

The above form has very small petals, not in contact with each other, short concave sepals, and a fairly normal epicalyx. On selfing the *micrantha* type or on crossing it with a normal wild strawberry or a tall white-fruited type from Visingsö, no *micrantha* types were obtained. Stolon shoots, however, developed characteristic *micrantha* plants. It is suggested that the *micrantha* type may be due to virus infection.

2199 Posnette, A. F.
Green petal—a new virus disease of strawberries.
Plant Path. 1953 : **2** : 17–18.

Auchincruive Climax, on which symptoms were first observed in 1951 in Kent, England, has since proved very susceptible to green petal virus; fruit seldom ripens on infected plants. Huxley, Royal Sovereign and Cambridge 422 (Favourite) have also been severely affected in tests but some varieties of the Cambridge Seedling series showed considerable tolerance.

2200 Simmonds, N. W.
The development of the banana fruit.
J. Exp. Bot. 1953 : **4** : No. 10 : 87–105.

Fruit development was studied in *Musa acuminata, M. Balbisiana* and their edible derivatives. Growth rates are related to ovule growth, seed content and chromosome number. The presence of seeds has a stimulative effect on pulp production, nearly six times greater in triploids than in seeded diploids. Pollination as such apparently has no effect upon fruit development. Treatment with α-naphthylacetic acid induces parthenocarpy in seeded types, and stimulates it in weakly parthenocarpic bananas; coumarin inhibits it in strongly parthenocarpic forms. Fruit development is discussed in terms of its probable control by hormones. Parthenocarpy in certain diploid families has recently been found to depend upon three dominant genes, seed sterility being conditioned by a complex of cytogenetical factors; the genetical determination of parthenocarpy primarily involves control of the hormones concerned. The role of human selection for fruit size and seed sterility in the evolution of the cultivated banana is briefly discussed. In clarifying the problem of whether parthenocarpy causes seed sterility, distinction between the terms seedless and parthenocarpic is advocated.

2201 Mendiola, N. B., Capinpin, J. M. & Mercado, T. M.
Pineapple breeding in the Philippines 1922-1941.
Philipp. J. Agric. 1951 (1952) : **16** : 51–84.

Hybridization carried out during this period at the College of Agriculture, Laguna, to combine the desirable characteristics of Red Spanish and Smooth Cayenne, and to obtain a large-fruited, spineless Buitenzorg type is reviewed. Preliminary results of treatment with 0·05% colchicine solution are also mentioned.

2202 Hershkovits, A.
(The planting of late varieties of table grapes).
Hassadeh 1952 : **32** : 277–79. [Hebrew].

Among the useful late varieties listed are Nahalal Shakhor [Black Nahala], also known as Farnakantel; it develops a short vine. Tamar Varod [Rosy Palm] resembles Palm of Beirut when ripe. The bunches are small with large berries. Saron Lavan [White Saron] ripens later

than the above varieties, is very productive and bears large grapes. White Dabuki, suitable for drying and for the wine industry, as well as for eating fresh, is not very productive.

2203 Soldatov, P. K.
(Viticulture in the Fergana valley).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1952 : No. 11 : 41–42. [Russian].

Kara Džandžal, Šakar Angur, Štur Angur, Deli Kaftar and Husaine Kadu, bred at the Uzbek Institute of Viticulture, and Babara, bred at the Central Asiatic Station of the Institute of Plant Industry, are regarded as promising new varieties for raisins or sultanas.

2204 Potapenko, I. P.
(A muscat grape for indoor cultivation).
Priroda (Nature) 1953 : No. 1 : p. 116. [Russian].

Komnatnyĭ Muscat [Indoor Muscat], which comes into bearing indoors in the second year and produces round golden grapes with a muscat flavour, has been recently developed at Novočerkassk. By regulating the dormancy period the variety can be induced to give two harvests a year or to change its normal harvest time to another season.

2205 Ivanova, E. B.
(The muscat varieties of vine in Central Asia).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1953 : No. 1 : 36–40. [Russian].

Crosses, from which several promising muscat varieties have been derived in recent years at the Central Asiatic Research Station of the USSR Institute of Plant Industry, are reported.

2206 Sudario, E.
Le sostanze coloranti nelle uve degli ibridi produttori diretti. **(The colouring substances in grapes of hybrid direct producers).**
Ann. Sper. Agr. 1953 : **7** : 157–63.

Grapes of American species of *Vitis* contain more monomethyl anthocyanins than dimethyl, the reverse relationship of that existing in the European grapes; the phenolic hydroxyl groups of the American species are also more readily oxidizable. The methoxyl number was determined in a number of direct producer hybrids and proved to be significantly lower than in Barbera, Dolcetto and Freisa, the European varieties serving as controls.

2207 Haĭdarkulov, G.
(The vine variety Panseri).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 1 : p. 47. [Russian].

Panseri has been selected from the local material in the Samarkand province. It is a productive table variety, which reaches maturity in September. The bunches are compact and attractive. The grapes are white, large and oval, with few seeds. Their flavour is good.

2208 Motovilov, D. S.
(Vines in Siberia).
Sad i Ogorod (Fruit & Vegetable Gardens) 1952 : No. 11 : 32–34. [Russian].

Breeding vines for earliness, hardiness and good quality of grapes was begun at Omsk in 1951. The material includes introductions from vine growing districts and varieties adapted to the Siberian climate.

FORESTRY

2209 Langner, W.
Ein Beispiel unterschiedlicher züchterischer Bedeutung des Genotyp und Phänotyp in Land- und Forstwirtschaft. **(An example of the different importance of genotype and phenotype in breeding agricultural plants and forest trees).**
Z. Forstgen. Forstpflanzenz. 1953 : **2** : 25–28.

It is pointed out that selective thinning makes it possible to use genetically much more heterogeneous material for planting forests than would be acceptable with agricultural plants; moreover a good phenotype suffices, since the progenies of the trees planted will not be utilized. Seed can be taken from the few individuals which in their 100 or more years of growth have shown themselves to be the best, and if necessary it can be produced by intercrossing such superior trees, which notably increases the chances of obtaining superior genotypes.

2210 Hitt, R. G.
Forest tree breeding in Sweden and other European countries.
J. For. 1952 : **50** : 924–28.

The author records his impressions of research in progress at the time of a six months' visit to Sweden during 1951.

2211 Barner, H.
Skovtræforædlingens muligheder.
(**Possibilities in forest tree breeding**).
Dansk. Skovforen. Tidsskr. 1952 : **37** : 62–79; also, Årsskr. 1951 Norske Skogplantesk. 91–107.

Methods that might be used in forest tree breeding in Denmark to improve yield and quality are discussed. The difficulty of estimating adult characters from observation of the young tree, which is particularly subject to environmental modification, should be met by the maintenance of close contacts with local foresters. The breeding value of promising trees should be ascertained by progeny or clone trials. Selection should be carried out at an age when the characters desired are clearly manifested. Other problems discussed were: induction of flowering; the provision of uniform conditions throughout comparative trials; the use and limitations of mass selection; individual selection in combination with progeny trials; controlled hybridization; the polycross as a possible way of detecting high combination value; and hybrid vigour.

2212 Hoffmann, D.
Die Rolle des Photoperiodismus in der Forstpflanzenzüchtung. (**The role of photoperiodism in breeding forest trees**).
Z. Forstgen. Forstpflanzenz. 1953 : **2** : 45–47.

Clones of *Populus trichocarpa* from Alaska and northern latitudes when grown at Boston, USA, were characterized by rapid spring growth and a sudden termination of growth in early summer, whereas clones from areas south of the 48th parallel grew more slowly but stopped less abruptly and at a later date. A single tree of *P. tremuloides* growing at Boston, when pollinated with pollen of *P. tremula* from three different latitudes, gave progenies with marked differences in growth rhythm; thus seedlings from pollen from a latitude of 63° 30′ N in Sweden stopped growing in early August, and those from pollen from 58° 31′ N in Norway by 21 August; they should therefore be suitable for areas with early frost, whereas seedlings from pollen from Munich (48° 5′ N) were still growing on 5 September; hybrids from pollen from still further south seem to be suitable for areas with a long growing season.
Factors other than day length, including the rate of change in photoperiod from day to day, also influenced the behaviour of clones transferred from one latitude to another.

2213 Wright, J. W.
Pollen dispersion studies: some practical applications.
J. For. 1953 : **51** : 114–18.

Comparisons between the dispersion distances of forest tree pollen in Indiana and Pennsylvania have been made in order to determine the distances which result in genetical isolation of each species. It is noted that when pollen travels only small distances, distinct local and geographical races are commonly found, whereas when pollen disperses over large distances, genes are readily exchanged between adjacent subpopulations and races are less common.

2214 Cedik-Tomaševič, Z. F.
(**Intraspecific and interspecific relationships between forest trees**).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 8 : 29–36. [Russian].

Quercus, *Acer* and *Ulmus* competed with one another when young trees of two or all three genera were grown in mixed plantations. No intraspecific competition occurred between the oak, maple and elm trees grown in a pure state, although the height and vigour of the individuals in each pure stand varied. The variability, which is regarded as a means of survival, was attributed to external conditions and acquired characters.

2215 Syrach Larsen, C.
Studies of diseases in clones of forest trees.
Hereditas, Lund 1953 : **39** : 179–92.

The use of "tree shows," consisting of grafts, buddings and cuttings of outstanding individuals, for studying reactions to fungi, insects and frost is discussed, and illustrated with examples from breeding in Denmark (cf. *PBA*, Vol. XVII, Abst. 1782; Vol. XIX, Abst. 2106 and Vol. XXII, Abst. 751).

2216 Yokoyama, K. & McGregor, R. L.
Variation of *Quercus Muehlenbergii* in Kansas.
Trans. Kans. Acad. Sci. 1951 : **54** : 370–73.

Four intergrading races of *Q. Muehlenbergii* have been distinguished on the basis of variation in leaf morphology. Possibly the variation is to some extent the result of introgression of *Q. macrocarpa*.

2217 Houtzagers, G.
Forest genetics and poplar breeding in the Netherlands. II. Poplar breeding in the Netherlands.
Euphytica, Wageningen 1952 : **1** : 161–74.

In the production of rapidly growing, canker

resistant poplars for the Netherlands, selection of existing forms and official inspection constituted the first step; hybridization is now also being carried out (cf. *PBA*, Vol. XXII, Abst. 3008). Crosses between poplars of the sections *Aigeiros* and *Tacamahaca* usually give F_1 hybrids susceptible to canker when artificially infected for three consecutive years. Tests of canker resistance are at present being made under more natural conditions in clonal interplantings with artificially infected, extremely susceptible types. Crosses between the *Aigeiros* and *Tacamahaca* groups, in either direction, always produce dwarfed offspring. Hybrids from crosses between the *Aigeiros* and *Leuce* groups are often stunted; the aim of these crosses had been to produce hybrids suitable for rather poor soils. Other methods of developing such hybrids are therefore being explored: crossing between the European *Populus tremula* and the American aspens; selection and hybridization among Dutch varieties or crossing with selections from other European countries; and crosses of the *Albidae* poplars with the *Trepidae* and *Aigeiros* poplars. Pure species have given better results than hybrids in crossing; indigenous *P. nigra* and subspecies of *P. deltoides* from the United States are expected to be especially valuable as parents.

2218 Nienstaedt, H.
Tannin as a factor in the resistance of chestnut, *Castanea* spp., to the chestnut blight fungus, *Endothia parasitica* (Murr) A. and A.
Phytopathology 1953 : **43** : 32–38.

An analysis of bark extracts of *C. mollissima*, *C. dentata* and *C. crenata* has shown that all three species contain tannins in sufficient concentration to retard the growth of *Endothia parasitica*. The pyrogallolic tannin from blight resistant *C. mollissima* is, however, more toxic and more water-soluble than tannins containing catechol, characteristic of susceptible species. Interaction of tannin type and solubility determines the relative resistance of interspecific hybrids.

2219 Poole, A. L.
Hybrid southern beeches.
N.Z. J. For. 1951 : **6** : 250–53.

An artificial hybrid has been obtained from the cross *Nothofagus Solandri* x *N. fusca*. Seedlings were also reared from a specimen resembling the so-called *N. Blairii*, which occurred intermixed with *N. fusca* and *N. cliffortioides*. These segregated widely and individuals approaching the latter two species were recovered. It seems probable, therefore, that *N. Blairii* is a hybrid of these two species.

2220 Pryor, L. D.
A genetic analysis of some *Eucalyptus* species.
Proc. Linn. Soc. N.S.W. 1951 : **76** : 140–48.

Segregation for diagnostic morphological characters in seedling progenies of individuals occurring on the southern highlands of New South Wales and in Victoria suggests that a number of the so-called species are F_1 hybrids or hybrids of more advanced filial or back-crossed generations. It is probable that segregating swarms resulting from hybridization between well-established species are more common than was formerly supposed. Under field conditions hybridization between the three major groups of the genus (cf. Abst. 2223) has not been observed. In view of these results, a thorough revision of the taxonomy of the genus is necessary.
An investigation of the genetic relationships of the now scattered and uncommon species *E. glaucescens* indicates that this species is rapidly being extinguished by the infiltration of genes from *E. viminalis*, a species with which hybridization readily occurs.

2221 Pilipenko, F. S.
(The biological principles of acclimatizing *Eucalyptus* to northern districts).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1950 : No. 5 : 11–25. [Russian].

The effects of external conditions upon morphological and biological properties of various species and hybrids cultivated along the Black Sea Littoral (cf. *PBA*, Vol. XXI, Abst. 2170) are discussed. Hardy species and forms developed in recent years include *E. georgica*, *E. batumiensis*, *E. sochinensis* and *E. cinerea* var. *mitis*. Material regarded as suitable for introduction into cold districts is described. Vegetative rapprochement between *Eucalyptus* and *Callistemon*, *Leptospermum*, *Feijoa* and *Tristania* is advocated as a method of breeding for hardiness.

2222 Penfold, A. R., Morrison, F. R., Willis, J. L., McKern, H. H. G. & Spies, M. C.
The essential oil of a physiological form of *Eucalyptus citriodora* Hook.
J. Roy. Soc. N.S.W. 1951 : **85** : 120–22.

Analysis has shown that the chief constituent of oil of *E. citriodora*, citronellal, is largely

replaced in the new form by an equivalent amount of citronellol and its esters. The new form is morphologically indistinguishable from the type species and grows in close association with the latter under natural conditions.

2223 Pryor, L. D.
Controlled pollination of *Eucalyptus*.
Proc. Linn. Soc. N.S.W. 1951 : **76** : 135–39.

Using simple pollination techniques, including emasculation and bagging, F_1 hybrids were obtained in New South Wales between *E. Maidenii* and the following closely related species: *E. bicostata*, *E. Blakelyi*, *E. Macarthuri*, *E. rubida* and *E. cinerea*. Some reciprocal crosses were also successful. Viable seed was rarely produced by crossing species belonging to the three major taxonomic groups, namely *Macrantherae*, *Renantherae* and *Terminales*. All species examined proved self fertile.

2224 Hall, M. T.
A hybrid swarm in *Juniperus*.
Evolution 1952 : **6** : 347–66.

A study was made of a hybrid swarm of *J. Ashei* and *J. virginiana* in Oklahoma. Combinations of the characters of both species were observed in the hybrids, but these characters tended to remain together, suggesting the probable effect of linkage in hindering recombinations for characters dependent on multiple factors. A hybrid index, approximately representing the group means of five characters for each individual of the population, was used to construct a frequency polygon for a sample of 25 trees. This index offers a crude but effective method for comparing populations and habitats, at least, wherever differential selection is the predominant variable affecting population structure.

2225 Mudrich, H.
Die Ausformung der Lärchenjugendkrone in Abhängigkeit von Boden und Veranlagung. (**The development of the juvenile crown in larch in relation to soil and heredity**).
Z. Forstgen. Forstpflanzenz. 1953 : **2** : 32–41.

A formula has been devised for describing the form of the larch crown on the basis of length, arrangement, angle of insertion and curvature of the branches, the so-called cone type representing one extreme and the bell type the other. Measurements were made with a ruler specially constructed for the purpose. In comparisons of trees of like genetic origin grown on different soil types, some mother trees and certain hybrid progenies proved more sensitive than others to the influence of soil conditions; also the direction of the change differed, some individuals becoming more bell-like and others more cone-like on passing from one soil type to another. The crowns of the European larch (*Larix europaea*) were on the whole narrower and more pointed than those of the Japanese larch (*L. leptolepis*). More variation was observed in the progenies of the European larch than the Japanese; hybrids between the two were mostly intermediate but the progenies of different mother trees differed in their degree of resemblance to one or other of the parental species.

2226 Leibundgut, H. & Kunz, R.
Untersuchungen über europäische Lärchen verschiedener Herkunft. I. Mitteilung: Ergebnisse von Anbauversuchen. (**Investigations on European larches of different provenance. Part I : Results of cultivation experiments**).
Mitt. schweiz. ZentAnst. forstl. Versuchw. 1952 : **28** : 408–96.

The existence in Switzerland of phenologically and morphologically different ecotypes of European larches was confirmed and demonstrated by observations relating to morphological, phenological and physiological features. The importance of accurately controlled physiological studies in diagnosing such types is stressed.

2227 Fischer, F.
Einige Ergebnisse aus dem Internationalen Lärchenversuch 1944. (**Some results from the 1944 International Larch Experiment**).
Mitt. schweiz. ZentAnst. forstl. Versuchw. 1952 : **28** : 355–407.

Out of five larches that have done best so far in the Swiss comparative trials of trees of different provenance, two were from Austrian lowlands, two from lowlands in the Tatra region and one from the Sudeten mountains. The records of growth increment, form, uniformity and disease resistance are discussed. The value of interspecific hybrids exhibiting heterosis is shown by the performance of the Visingsö larch No. 55, which is considered to be a hybrid between the Scottish and Japanese larch.

2228 Bartels, H.
Untersuchung über die Vitalität der Koniferenkeimlinge in Abhängigkeit vom Keimzeitpunkt. (**Investigation on the vitality of coniferous seedlings in relation to the time of germination**).
Z. Forstgen. Forstpflanzenz. 1953 : **2** : 42–45.

In spruce and pine the late germinating seeds

gave rise to seedlings with a lower energy of germination, expressed in terms of their capacity to penetrate a given layer of sand; no clear relationship was detectable in larch seedlings. The observations, combined with measurements of the rate of growth of the seedling roots, led to the conclusion that time of germination and vitality of seedling are both influenced by seed weight and other factors. The first seeds to germinate are generally the heaviest in spruce and the lighter ones in pine and larch.

2229 Rudolf, P. O. & Ralston, R. A.
Do age of mother trees and age of cones affect development of young jack pine ?
J. For. 1953 : **51** : 121–24.

Data presented from tests undertaken at the Huron National Forest, Mich., show that *Pinus Banksiana* seedlings, grown from seed obtained from mother trees ranging in age from 51 to 80 years and from cones up to 5 years old, do not differ appreciably in either growth or quality up to 14 years after germination.

2230 Tôyama, S.
[**On variation in the grand period of growth in saplings of *Cryptomeria japonica*. (Breeding and fundamental studies of forest trees. IX)**].
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : p. 105. (Abst.). [Japanese].

Differences between Japanese strains of *C. japonica* with respect to the period of maximum rate of elongation are noted.

2231 Wareing, P. F.
Experimental induction of male cones in *Pinus sylvestris*.
Nature, Lond. 1953 : **171** : p. 47.

Removal of the terminal buds of young pine trees hastened the production of male shoots; this technique might prove valuable in forest tree breeding.

2232 Stern, K.
Methodik der vergleichenden Beurteilung von nach der Langparzellenmethode angelegten Kieferneinzelstammsaaten. (**Method of comparative assessment of single plant pine sowings laid out according to the method of adjacent plots**).
Züchter 1953 : **23** : 1–16.

The growth curves of a set of pine seedlings were studied by Backmann's method, the increments being plotted on logarithmic probability paper. Rapid early development was almost invariably correlated with slower development in the later stages and it is concluded that in pines selection for final performance can only be effectively carried out by comparing the growth curves of parents and offspring.

2233 Illies, Z. M.
Keimlingsabnormitäten bei *Picea Abies* (L.) Karst. [**Seedling abnormalities in *P. Abies* (L.) Karst.**].
Z. Forstgen. Forstpflanzenz. 1953 : **2** : 28–32.

Various cases of twinning and multiple seedlings, of enlarged hypocotyl and cotyledons and of seedlings in which the cotyledons emerged before the radicle are described and illustrated (cf. Abst. 1486). The frequency of abnormal seedlings varied in the progeny of different trees and some trees showed a pronounced tendency towards abnormality, which is evidently genetic.

VEGETABLES

2234 Kopinašvili, V. Ja.
(**Some varieties developed by an experimental plant breeder**).
Sad i Ogorod (Fruit & Vegetable Gardens) 1952 : No. 11 : 52–54. [Russian].

Descriptions are given of the onion Record Boržomskiĭ, the cabbage Ideal, and the tomato Muzaradi, developed in Georgia and exhibited in 1939 and 1940. A new melon bred from Carica Dynj [Melon Queen] x Large Prescott is under trial at the Goriĭskaja Research Station. It is early and produces fruits weighing 2·5 kg. The flavour is good.

2235 Grooters, G. F. & Sneep, J.
De productie van groentezaden in de Verenigde Staten. (**The production of vegetable seeds in the United States**).
's-Gravenhage Pp. 124. (Mimeographed).

This report of a study tour reviews the organization and methods of vegetable seed production by American breeders (cf. Abst. 1512). As compared with Dutch methods, American breeders make more use of gene material from wild plants.

2236 Weibull, G.
The cold storage of vegetable seed and its significance for plant breeding and the seed trade.
Agri Hort. Genet., Landskrona 1952 : **10** : 97–104.

Results of germination tests carried out at the Weibullsholm Seed Testing Station, Landskrona,

Sweden, after storing seeds at low temperatures, show that many vegetable seeds remain viable for four years if kept at −20° C. It is suggested that such storage may be practicable in breeding certain vegetables, and possibly also forest trees, if good seed crops are scarce.

2237 Banga, O.
Some factors in the growth rate of red garden beets.
Euphytica, Wageningen 1952 : **1** : 201–11.

Experiments were carried out on the growth rate of several varieties at Wageningen, Netherlands, with a view to obtaining information useful in selection (cf. *PBA*, Vol. XXI, Abst. 2191). Growth rate of the root is largely determined by foliage type, characterized by its efficiency (foliage weight per 100 grm. of root) and the foliage weight per plant. Examples are given of different combinations of these two characters. Contrary to expectation, a large top with low efficiency was not an advantage in dry, cold weather; in fact, a short top with high efficiency was more resistant to such conditions. In dry hot weather a large-topped type that is naturally late ripening may be more satisfactory than a short-topped type maturing relatively early. A low value of the ratio of potash content of the foliage to the potash content of the root is indicative of a type with the potentiality of high growth rate and with a relatively low dry matter content of the root; a high value indicates the reverse.

2238 Nishiyama, I.
(Studies on triploid radish hybrids).
Idengaku Zasshi/Jap. J. Genet. 1949 : **24** : 74–75. (Abst.). [Japanese].

A report is given of seed production in direct and reciprocal crosses between diploid and tetraploid radish strains.

2239 Hawthorne, M. E.
The cytological effects of the antibiotic acti-dione.
Diss. Abstr. 1952 : **12** : Publ. No. 1 : 3077 : p. 8. (Abst.).

During treatment of onion root tips with 1–80 ppm. solutions of Acti-dione for 12 hrs., the first 5 hrs. proved the most critical period for observing cytological aberrations. Differences in the relative frequencies of the individual stages of mitosis and in the types of aberrations are discussed. It is assumed that the threshold of toxicity is very close to that necessary for the production of aberrations; the threshold for each type of aberration is probably a combination of concentration and time within 1–5 ppm. and 0–15 mins. The action of Acti-dione resembles that of a slow fixing agent with differential effects on the nuclear and cytoplasmic components; as the degree of fixation increases, the several types of aberration appear. Analyses of mitotic aberrations have led to the following suggestions concerning normal mitosis: (*a*) a gradual formation of the spindle; (*b*), cytoplasmic origin of part of the spindle; and (*c*) the possibility that anaphase movements arise by some mechanism originating within the chromatids themselves.

2240 Torres, C. B.
A influência do fotoperíodo na formação do bulbo nas variedades riograndenses de cebola (*Allium cepa* L.). [**The influence of photoperiodism on bulb formation in the Rio Grande varieties of onion (*A. cepa* L.)**].
Agros, Rio Grande do Sul 1951 : **4** : 219–34.

Five onion varieties, all produced by the Horticultural Experiment Station of Rio Grande in Brazil, differed in the minimum photoperiod required for bulb formation; one variety required 12, two required 13 and two others 14 hours.

2241 Tatebe, T.
Cytological studies on pollen degeneration in male sterile individuals of the onion.
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1952 : **21** : 73–75. [Japanese].

The development of the anther in male sterile plants of the Japanese variety Senshuhiragutaotamanegi [Izumi Large Flat onion] is described. Cell division proceeds normally till the formation of the pollen grains, but these develop no further, and the tapetum meanwhile breaks down into a periplasmodium and finally disintegrates together with the undeveloped pollen grains.

2242 Meurman, O.
Siemensipulilla suoritettujen lajikekokeiden antamia tuloksia. (**Some results obtained from varietal experiments performed with onions**).
Koetoiminta ja Käytäntö 1952 : **9** : No. **4** : 1–2.

Experiments are described, performed over a number of years, and data are given for comparative yields and bulb sizes in several varieties using Keltainen Zittauer [Yellow Zittau] as the

standard. The best yields were obtained from this variety, Braunschweig and Autumn Queen.

2243 Kahn, R. P., Anderson, H. W., Hepler, P. R. & Linn, M. B.
An investigation of asparagus rust in Illinois. Its causal agent and its control.
Bull. Ill. Agric. Exp. Sta. 1952 : No. 559 : Pp. 56.

The results of tests of the reactions of asparagus varieties and selections to rust (*Puccinia Asparagi*) are reported in detail (cf. *PBA*, Vol. XXII, Abst. 2290 and Vol. XXIII, Abst. 1524). The species *Asparagus Sprengeri*, *A. plumosus*, *A. scandens* var. *deflexus* and *A. virgatus* were also tested; none exhibited symptoms under conditions that produced 100% infection in *A. officinalis*.

2244 Nikonenko, D. A.
(Cabbage varieties and their sowing dates).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 1 : 59–63. [Russian].

Economic properties of several cabbage varieties, tested in the Stavropolj territory, Grozno province and Kabarda ASSR, are described.

2245 Spencer, D. M. & Glasscock, H. H.
Crook root of watercress.
Plant Path. 1953 : **2** : 19–21.

Results of further investigations at Wellesbourne, England, have confirmed previous indications that the green-leaved diploid *Nasturtium officinale* is more resistant to crook rot than the brown-leaved triploid hybrid *N. uniseriatum* x *N. officinale* (cf. *PBA*, Vol. XXII, Abst. 1479).

2246 Ullman, H.
(The rearing of melons).
Hassadeh 1952 : **32** : 323–24. [Hebrew].

The work of selecting and purifying local melons, which are natural hybrids, has been going on in Palestine since 1938, in view of the difficulty of keeping imported American and European varieties free from mildew, and in view of their alleged lack of flavour. This work has led to the selection of varieties 37 and 77 at Naveh Yo'ar in 1949. Variety 37 is large, golden-skinned, salmon-fleshed, and sweet, while 77 is smaller, more highly flavoured, with white flesh and hollow seed cavity. In 1950, when 77 was grown on a wide scale, it was found to be identical with a seedling named Ananas. Ananas is now being crossed with Honey Dew and Golden Beauty.

2247 Dolan, D. D.
Rhode Island Red, a new watermelon.
Seed World 1952 : **71** : No. 10 : p. 16, 18.

The water melon Rhode Island Red (Dixie Queen x Honey Cream) has early maturity, red flesh, dark seeds, tough rind and good quality. The rind is twice as thick as that of Dixie Queen and is whiter and tougher. For the purpose of selection, rind toughness was measured by compressing the fruits individually in an enlarged type of nut cracker and reading on a suitable scale the amount of pressure withstood.

2248 Gordon, J. M.
The problem of the pumpkin-rind watermelon.
J. Hered. 1952 : **43** : p. 252.

A brief discussion is given of the possible origin of the "pumpkin-rind" water melon, characterized by golden yellow rind and deep red flesh when fully ripe. It has been observed in the Red River Valley, USA, and may have originated as an introduction into Texas.

2249 Tjallingii, F.
Onderzoekingen over de mozaïekziekte van de augurk (*Cucumis sativus* L.).
[**Investigations on the mosaic disease of the gherkin (*Cucumis sativus* L.)**].
Meded. Inst. PlZiektKund. Onderz. No. 47 : Pp. 117.

After a review of research in various countries on breeding for resistance to mosaic in gherkins, the characteristics of the gherkin virus commonly found in Holland and its identity as one of the ring spot strains of *Cucumis* virus 1 are described. Host plants in Holland are discussed and four new probable hosts are listed.

No variety of *C. sativus* genuinely resistant to mosaic has been found and the Dutch collection of gherkins contains no variety tolerant enough for practical use, so that selection of Dutch material offers no promise of success. It seems, however, possible that a tolerant cultivated race may be ultimately obtained from a cross made between the highly tolerant Japanese field cucumber, Tokyo Long Green, and the very susceptible cultivated races Baarlose Neitplekker 6 and 7. Tolerance seems to be conditioned by three or more cumulative polymeric factors.

2250 Munger, H. M.
Two new mosaic-resistant cucumbers.
Fm Res. 1950 : **16** : No. 4 : p. 13.

The mosaic resistant varieties Yorkstate Pickling and Niagara have been released for cultivation

in New York State; the latter is a slicing type. Yorkstate Pickling was developed by crossing Chinese Long and Early Russian and repeatedly crossing suitable selections with National Pickling. Niagara was derived from a cross between the resistant strain Kansas 19B–6–4–1–1–9–2–14–6 and Cubit.

2251 **New hybrid tomato is early heavy-yielder.**
Sth Seedsman 1953 : **16** : No. 1 : p. 91.

H., V.E.
The Early Giant tomato.
Seed World 1952 : **71** : No. 11 : p. 14.

The release of Early Giant, an F_1 hybrid combining large fruit size and high yields with early maturity, is reported. The new tomato, bred at Rocky Ford, Colo., is widely adaptable in the USA and is recommended for its quality and colour.

2252 Krispin, S.
(**Grafting tomatoes on *Solanum nigrum***).
Hassadeh 1952 : **32** : 233–34. [Hebrew].

In an attempt to transfer the hardiness, disease resistance and tolerance of varying soil conditions of *Solanum nigrum* to the tomato, the tomato variety Marmande was grafted on to *Solanum nigrum*. From the seed produced by the scion, plants were raised with the vegetative characteristics of *S. nigrum* but with small tomato-like fruits.

2253 Felföldy, L.
Paradicsomfajták vízforgalmára vonatkozó élettani kísérletek. (**Physiological experiments on the movement of water in tomato varieties**).
Agrokém. és Talajtan 1951 : **1** : No. 1 : 85–98.

Information is given on the physiology of water balance in three Hungarian varieties, for preliminary experiments suggest that vegetative hybrids only result from physiologically different graft components, for example, varieties differing in the physiology of water balance.

2254 Richardson, R. W. (Jun.).
Genetic effects of reduced fertilization in tomato flowers.
Diss. Abstr. 1952 : **12** : Publ. No. 3656 : p. 293. (Abst.).

A summary is given of the results of experiments on the effects of modifying pollen tube growth by the removal and nonremoval of styles of emasculated and nonemasculated flowers 24 hours after pollination. The fruits were cut into two equal halves at right angles to the stem-flower axis and the seeds were extracted from each half separately. The presence or absence of the style affected seed production, number of segregates for the recessive phenotype potato leaf (*cc*) and percentage of recombinants for leaf type (*cc*) and determinate growth habit (*spsp*). Plants raised from seeds in the stem-half of the fruits showed a deficiency in the number of *cc* phenotypes. The data suggested that, when the style was not removed, elimination of genotypes for low early yield and elongated fruit shape occurred as a result of pollen tube competition.

2255 Turbin, N. V.
(**Multiparental fertilization of plants**).
Priroda (Nature) 1953 : No. 2 : 101–104. [Russian].

At Leningrad the effects of supplementary fertilization upon heritable properties of the tomato hybrids Aphiachette x self pollen + Sparks + Bison and Planovyĭ [Plan] x self pollen + Sparks were investigated. The foreign pollen was in either case applied to the flowers 25 hours after they were selfed. The F_1 from the first named cross comprised some families differing from Aphiachette, in respect of leaf and fruit characters, and others resembling it, with broad leaves and red pear-shaped fruits. However, the families of the Apiachette type gave segregates in respect of these characters in the F_2.
The other cross, involving a determinate variety, Planovyĭ and an indeterminate variety, Sparks, gave in the F_1 some families of the determinate type and others that gave segregates in respect of this character. All material produced determinate and indeterminate types in the F_2.
Reference is also made to multiparental hybrids of wheat, pea and radish, obtained by similar methods in Leningrad.

2256 Turbin, N. V.
(**The fertility of plants and vitality of their seed progeny in relation to the state of aging of the reproductive organs**).
Bot. Ž. (Bot. J.), Moskva 1952 : **37** : 764–72. [Russian].

Tomatoes, cross-pollinated a few days after their flowers opened, gave a higher percentage set and showed more marked heterosis than those from similar crosses made on the day the flowers opened or at the end of the flowering period. On the other hand, selfing within a few days of opening of the flowers (in this instance of the

red cabbage variety Zenith) intensified the deleterious effects of inbreeding upon fertility and vigour. Experiments on pollination of several varieties of pea with fresh pollen, and pollen kept for 3–4, 6–7 or 9–10 days showed that the material gave a lower percentage set and produced pods with fewer seeds when the pollen was kept for more than 6 days. Moreover, the capacity of the male parent for transmitting its characters to the progeny was weakened. For instance, the cross between Neistoščimyĭ [Inexhaustible] which has wrinkled seed (recessive) and Olivkovyĭ [Olive], which has smooth seed (dominant), gave a progeny with wrinkled seed when the pollen was kept for a longer period than 6 days. In some crosses changes in the transmission of the recessive and dominant characters, due to the age of the pollen, also occurred in respect of seed colour and plant height. Different segregation ratios were observed in several F_1 hybrids when the pollen was fresh or 6–7 days old. For instance, the F_1 from a cross between Neistoščimyĭ, which has wrinkled yellow seed, and Rannii Zelenyĭ [Early Green], which has smooth green seed, had the normal ratios of smooth to wrinkled seed and yellow to green of 3 : 1. These ratios of smooth to wrinkled and yellow to green changed to 1 : 7·2 and 26·1 : 1 respectively when 6–7 day old pollen was used to obtain the F_1.

2257 Brink, N. P.
(Sorting the seed of tomatoes increases their productiveness).
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 9 : 59–61. [Russian].

The tomato varieties Majak [Lighthouse], Krasnodarec [Krasnodar] and Maljutka 101 [Small 101] yielded appreciably more fruits per ha. when grown from seed with a high specific gravity than from unsorted seed or seed with a low specific gravity.

2258 Costa, A. S.
Necrose acrópeta do tomateiro, de origem genética. **(Acropetal necrosis of tomato, of genetic origin).**
Bragantia 1951 : **11** : 93–97.

Necrotic lesions simulating those from a virus attack were observed in certain plants originating from a cross of *Lycopersicon esculentum* x *L. pimpinellifolium*. The condition was not transmissible by grafting but some of the progenies of necrotic plants were all necrotic, whilst others segregated. Plants of the former type when crossed with normals also gave progenies consisting exclusively of necrotic plants; F_2 and backcross results confirmed that the necrosis is due to a single dominant gene, designated *N*.

2259 McCue, G. A.
The history of the use of the tomato : an annotated bibliography.
Ann. Mo. Bot. Gdn 1952 : **39** : 289–348.

An annotated bibliography of the history of the use of the tomato is presented, the citations being grouped geographically. The bibliography deals only with countries where the tomato was introduced, Central and South America therefore being omitted. E. Anderson contributes a foreword, pointing out that according to the bibliography the tomato became an important component of the dietary of North America, not by way of Mexico, but through the Italians and French; the French apparently first used the tomato through Italian influence; the Italians in their turn acquired its use from the Turks or at least from peoples in the Levant.

2260 Lecrenier, A. & Tilkin, N.
Étude du rendement de quelques variétés de tomates en 1952. **(Study of the yield of some varieties of tomatoes in 1952).**
Bull. Hort., Liège 1953 : **8** : 42–49.

The performance of a collection of tomatoes, studied in comparative varietal trials in the open in the different regions of Belgium, is set out in tables, with notes on the origin and characteristics of each variety.

2261 Goljdgauzen, M. K.
(A new variety of egg plant, Kuljdžinskiĭ).
Sad i Ogorod (Fruit & Vegetable Gardens) 1953 : No. 1 : p. 64. [Russian].

Kuljdžinskiĭ was bred in Moldavia from a sample with a long vine, which was obtained from the Institute of Plant Industry. It is more productive than Grečeskiĭ [Greek] and Gribovo and its yellow netted fruits are larger and will remain tender when grown under drought conditions. They are suitable for processing and as forage.

2262 Oinuma, T.
(Caryotypes in *Solanum*).
Idengaku Zasshi/Jap. J. Genet. 1949: **24** : 78–79. (Abst.). [Japanese].

The chromosome complements of representative species of *Solanum* are classified into three groups on the basis of chromosome size and the presence or absence of trabants. The first group includes *S. alatum*, *S. miniatum*, *S. villosum*, *S. guineense* and *S. nigrum*, the second,

S. lyratum, and the third *S. Melongena* and *S. Lycopersicon*.

2263 Tanaka, M.
(Polyploid egg plants).
Idengaku Zasshi/Jap. J. Genet. **1949** : **24** : 98–99. (Abst.). [Japanese].

Comparative data are provided on the physiological, vegetative, floral and fruit characteristics of diploid and colchicine-induced tetraploid strains of egg plants. The reduced fertility of the C_1 tetraploids improved in the C_2.

2264 De Peulvruchten Studie Combinatie 1948. **(The Pulses Study Group, 1948).** Pp. 43.

This report contains information of interest to Dutch seed firms and individual growers on the cultivation of pulses. The performance of various types and varieties of peas and beans on different types of soil in various districts in Holland is reviewed and reports are included on studies of quality and resistance to deficiency and other diseases. In a note on quality determinations, Dutch breeders are recommended to carry out tests of the percentage of pods in relation to seeds in the course of selection.
A committee, set up for the study of land races of peas and beans, has experienced difficulty in finding growers to maintain them.
Beans. The variety Atlas, bred by the firm van der Have from Great Northern x Dubbele Stamprinces [Double Dwarf Princess], is mentioned as a promising late ripening, large-seeded white bean. The work of C. W. van Belzen on white beans suggests that the climbing character is linked with pure white colour, as also occurs in the Walcheren white bean. It also seems possible that, by X irradiation, nonclimbing mutants with pure white seeds may be obtainable.
The West-Friesland Cooperative at Wijdenes hopes to breed an earlier ripening variety to replace Krombek.
Peas. Breeding of round green peas is concentrated mainly on disease resistance, especially foot rot and American wilt, due to *Fusarium* infection, and it is hoped that new resistant varieties will soon be available that are also superior in yield and other agricultural characteristics. A new resistant strain of Rondo is announced as replacing the original Rondo. Results of comparative trials of resistant and susceptible varieties on different types of soils are tabulated.
A new marrowfat pea, Markant CB, is expected to outyield Zelka.
Breeders are working on the production of high yielding varieties of grey peas, improved quality being the primary aim.
The yield and quality of some maple peas, including Vinco CB, Mansholt's 889–45 and 789–44, Helios and Erecta are recorded for various districts and soils. Mansholt's 789–44 seems to be an improvement on Gruno, which it resembles.
Six new varieties of edible-podded peas, entered in the variety register and cited without comment, are Largo, Fuga, Cressent, Fortuna, Orion and Cupido. Breeding for high quality in combination with earliness is in progress.
Soya bean. A number of imported Swedish varieties are to be tested.

2265 Gligić, V.
Metod kulture u suznom soku. **(A method of cultivating plants in sap obtained by tapping).**
Rad. Poljopriv.-Sumarsk. Fak. Univ. Sarajevu 1952 : **1** : 125–30.

At Sarajevo, germinating bean plants, with their cotyledons removed, grew well when cultured upon the sap obtained by tapping a vine. The plants did not develop upon birch sap. The technique is recommended for experiments on vegetative hybridization.

2266 Frahm-Leliveld, J. A.
Some chromosome numbers in tropical leguminous plants.
Euphytica, Wageningen 1953 : **2** : 46–48.

Chromosome determinations from root tip cells are reported for 36 plants used as food, forage or cover crops in Indonesia and Brazil; many numbers are recorded for the first time. *Tephrosia Hookeriana* is claimed to have $2n = 22$, the same as three other species in this genus, in contrast with a record of $2n = 32$ in Darlington and Janaki Ammal's *Chromosome Atlas of Cultivated Plants* (cf. *PBA*, Vol. XVI, p. 248).

2267 Cruchet, P.
Distances à observer dans les cultures de haricots porte-graines. **(Spacing that must be used in cultures of seed plants of beans).**
Rev. Hort. Suisse 1953 : **26** : 46–47.

The author's observations lead him to believe that *Bombus terrestris* may be responsible for cross pollination in beans; and he therefore suggests 100 metres as a minimum distance between seed plots of different varieties instead of the usual 4 metres.

2268 Howard, A. & Pelc, S. R.
Nuclear incorporation of P^{32} as demonstrated by autoradiographs.
Exp. Cell Res. 1951 : **2** : 178–87.

Roots of *Vicia Faba* were grown for 2–48 hrs. in solutions of NaH_2PO_4 containing P^{32}. Subsequent examination of autoradiographs made from meristematic and other tissues show that P^{32} was incorporated as an organic compound, probably desoxyribonucleic acid, by cells preparing for division. No synthesis involving P^{32} occurred during mitosis, but the P^{32} already incorporated was inherited in the organic form by daughter cells.

2269 Perlova, R. L.
(An experiment on growing beans in Moscow).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1950 : No. 5 : 71–74. [Russian].

The collection of *Phaseolus* beans at the Moscow Botanical Garden includes some early and productive varieties, which are listed. Zolotaja Gora [Golden Mountain] may produce as many as 74 pods per plant.

2270 Lamprecht, H.
Weitere Koppelungsgruppen von *Phaseolus vulgaris.* **(Further linkage groups of *Ph. vulgaris*).**
Agri Hort. Genet., Landskrona 1952 : **10** : 141–51.

By analysis of cross 526 between the snap bean Konserva and a typical Perlbohne [Pearl bean] line, the new gene *te* (*tenuis*) conditioning the Pearl bean type, whose narrow, short pod is recessive to the pod type of the common French bean, was identified.

The above cross segregated for the genes *Ins*, *R*, *Cor*, *Fa*, *Y*, *Miv* and *Te* and two new linkage groups involving (1) *Y*, *Te* and *Miv* and (2) *Ins* and *Cor* were established.

In sterile *gas gas* plants *gas* occasionally mutates to *Gas*, the rate of mutation observed in one line heterozygous for this gene being 1 per 1000. In cross 526, however, the rate was 7 per 1000.

2271 Lamprecht, H.
Ein Gen für *truncata*-Samen bei *Phaseolus*. **(A gene for *truncata* seeds in *Phaseolus*).**
Agri Hort. Genet., Landskrona 1952 : **10** : 105–112.

Previous studies have shown that the *truncata* character is conditioned indirectly by the genes determining the distance between the funicles, acting in conjunction with the genes for seed length (cf. *PBA*, Vol. IV, Abst. 1120).

A cross, No. 526, was made between a line in which the *truncata* character was pronounced and one in which it was slight. The results showed a strong correlation between pod length, or distance between the funicles, and the *truncata* character. Extremely marked *truncata*, which segregated as a simple recessive, is attributed to the action of a pleiotropic gene termed *miv* (*minus intervallis*) which also determines the short distance between the funicles.

Some evidence was also found suggesting that genes affecting seed length independently of pod length may exist.

2272 Zubkus, L. P.
(Growing fertile *Phaseolus* plants from embryos with the cotyledons removed).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1950 : No. 5 : 97–101. [Russian].

A high percentage of healthy plants was obtained when the embryos were first cultured upon agar and then in soil gathered from underneath productive *Phaseolus* plants. Some of the material produced undeveloped or abnormal flowers, and the plants that flowered normally shed their flowers prematurely at a later stage. The latter plants showed great variability in respect of flowering date. In some plants, premature shedding was overcome by leaving only one flower bud and removing all others as soon as they appeared. Such material produced pods with 1–4 normally developed seeds each.

2273 Thomas, H. R. & Zaumeyer, W. J.
A strain of yellow bean mosaic virus producing local lesions on tobacco.
Phytopathology 1953 : **43** : 11–15.

The reaction of numerous bean varieties to the severe yellow mosaic strain isolated at Twin Falls, Idaho, was determined at Beltsville, Md. Only the Great Northern varieties UI 16, UI 31 and UI 123 were resistant; these have already proved good sources of resistance to other strains of yellow and common bean mosaic and curly top, and are therefore recommended to breeders.

2274 Cordner, H. B. & Wester, R. E.
Nematode-resistant baby lima beans.
Sth. Seedsman 1953 : **16** : No. 2 : 30, 46, 57.

An account is given of the successful incorporation of a high degree of nematode resistance, shown by strains obtained from the Hopi Indians of Arizona, into commercial lines at the Oklahoma Agricultural Experiment Station. Numerous nematode-resistant white-seeded

selections from crosses between Hopi strains and Baby Fordhook have been crossed and backcrossed to susceptible Early Thorogreen, giving rise to families with desirable green cotyledons. Selection for superior plant type, heat tolerance and other characters is nearing completion prior to seed increase.

2275 Imam Mahmud & Probst, A. H.
Inheritance of gray hilum color in soybeans.
Agron. J. 1953 : **45** : 59–61.

Flower colour in the cross Mandarin (Ottawa) x Lincoln depended upon a single gene pair, *Ww*, purple being dominant to white. Pubescence colour was also determined by a single factor pair, *Tt*, tawny being dominant to grey. The parents in the above cross had a colourless and black hilum respectively. The grey hilum of the F_1 was due to the presence of an inhibiting factor, either different from the completely inhibiting factor *I* reported by previous workers, or the same, but in the presence of *T* and *W* having an incomplete effect upon *R* for the production of anthocyanin pigment. The relationships between the colours of the flower, pubescence and hilum agreed with the findings of other investigators.

2276 **Yellow Gatan soybean is released for Georgia use.**
What's New Crops Soils 1953 : **5** : No. 6 : p. 29.

A productive yellow-seeded selection from Gatan soya bean, resembling the latter in all respects except seed colour, has been released by the Georgia Experiment Station as Yellow Gatan.

2277 Athow, K. & Probst, A. H.
The inheritance of resistance to frog-eye leaf spot of soybeans.
Phytopathology 1952 : **42** : 660–62.

F_2 and F_3 data from six crosses involving Lincoln, Gibson, Chief, Hawkeye, Patoka, Wabash and Perry indicated that reaction to frog-eye leaf spot (*Cercospora sojina*) was determined by a single gene pair, *Cs cs*; resistance was dominant to susceptibility.

2278 Pendleton, J. W., Osler, R. D., Farnham, C. H. & Cartter, J. L.
Soybean varieties for Illinois.
Circ. Ill. Agric. Exp. Sta. 1952 : No. 700 : Pp. 8.

The results of soya bean varietal trials carried out in Illinois during recent years are summarized.

2279 Lamprecht, H.
Polymere Gene und Chromosomenstruktur bei *Pisum*. (**Polymeric genes and chromosome structure in *Pisum*).**
Agri Hort. Genet., Landskrona 1952 : **10** : 158–167.

The cases so far known in *Pisum* of interchange and of polymeric genes are reviewed, and a new polymeric recessive gene *fas* which, when present with the recessive *fa* (*fasciata*), conditions the formation of a fasciated stem, is recorded (cf. *PBA*, Vol. XV, Abst. 488 and Vol. XVIII, Abst. 1301). Plants heterozygous for *fa* or *fas* exhibit rather marked heterosis.
From a study of the known interchanges homologous segments have been discovered in chromosomes I and V; III and V; IV and VI; and VII and a chromosome not yet identified.

2280 Gelin, O.
Weibulls Strålärt. En röntgenmutation ur Klosterärt. (**Weibull's Stråal pea. An X ray mutation from the Kloster pea).**
Weibulls Ill. Årsb. 1953 : **48** : 28–30.

The technique of inducing mutation by X irradiation is explained and a preliminary description is given of the new X ray mutant Strålärt [Ray pea], derived in the X_2 of Kloster [Cloister], a selection from Monopol x Ambrosia. At Weibullsholm during 1946–52, Stråal outyielded Kloster (cf. *PBA*, Vol. XVI, Abst. 1454) by 6%, which in eight years of official trials had yielded 10% more than all the commercial varieties tested. It compares well with Kloster in earliness and its 1000 seed weight is 165 grm. as compared with 173 for Kloster and 175 for Torsdags III [Thursday III].

2281 Hvatova, K. A.
(**Intervarietal hybridization of the pea).**
Selekcija i Semenovodstvo (Breeding & Seed Growing) 1952 : No. 8 : 23–27. [Russian].

At Leningrad, peas were pollinated with and without emasculation and a high percentage of hybrid seed was obtained in either case. The F_1 hybrids of Temnozelenyĭ [Dark Green] x Masličnyĭ [Butter] and Masličnyĭ x (Capital x L 453) made by either method were superior to the parents, but those produced by pollination without emasculation formed more pods and seeds per plant than the others. The 1000 seed weights of these hybrids were also higher. Analogous results were obtained with intravarietal hybrids of Masličnyĭ.

2282 Argikar, G. P.
Segregation for cotyledon colour in *Cicer arietinum* L.
Poona Agric. Coll. Mag. 1952 : **43** : 102–08.

Cotyledon colour showed a monohybrid segregation, yellow being dominant over green; the character was in most cases independent of seed coat colour.

2283 Perlova, P. L. & Matjuševskaja, M. I.
(An experiment on growing the chickpea in Moscow).
Bjull. Glavnogo Bot. Sada (Bull. Princ. Bot. Gdn.), Moskva-Leningrad 1950 ; No. 6 : p. 91. [Russian].

A collection of *Cicer arietinum* at the Central Botanical Garden included material from Armenia, Azerbaïdžan, the Crimea, Uzbekistan, Tadžikistan, Bulgaria, Czechoslovakia, Spain, Italy, India, Persia and Abyssinia. A Czechoslovakian sample, 368, and a hybrid, H-27, developed tall stems suitable for combine harvesting and bore many large pods with large white or pale yellow seed.

2284 Wolf, E. A.
Cooperative trials assure better sweet corn for Dixie.
Sth. Seedsman 1953 : **16** : No. 3 : 36, 52.

Aristogold Bantam Evergreen and Calumet proved outstanding in cooperative trials in southern USA during 1952. The former is to replace Golden Cross Bantam as the standard hybrid for 1953.

2285 Snell, R. S.
Two new hybrid sweet corn varieties ready for trial.
N. J. Agric. 1953 : **35** : 14–15.

The early maturing experimental hybrids NJ 101 (Purdue 39 x NJ 143y) and NJ 106, now ready for farm trials in New Jersey, are briefly described. The former is resistant to bacterial wilt and smut, and has outyielded Carmelcross. The latter has given higher yields than Marcross.

2286 Smith, G. M.
Golden Harvest hybrid sweet corn.
Sta. Bull. Purdue Agric. Exp. Sta. 1952 : No. 578 : Pp. 6.

The single hybrid Golden Harvest and its parent inbreds are described in detail (cf. *PBA*, Vol. XXII, Abst. 2356).

2287 Andrew, R. H.
Two new sweet corn hybrids are released by University of Wisconsin.
Seed World 1953 : **72** : No. 4 : 48–49.

Wisconsin Golden 900 (W 3742 x WC 7) is a hybrid suitable for canning and market gardens, bearing 12-rowed ears ready for harvesting four days earlier than Golden Cross Bantam. Wisconsin Golden 950 (W 3647 x W 3742) is a midseason hybrid, producing ears with 12–16 rows; it is especially suitable for mechanical harvesting. Both hybrids have outyielded Golden Cross Bantam. Inbred W 3742, used in both hybrids, is a second cycle line from P 39 x P 14. It possesses three notable characters, which it transmits in varying degrees to its hybrids: absence of tillers; two ears per stalk; and high number of narrow husks, ensuring good protection and easy husking.

2288 **New Corneli hybrid wins name, "Prosperity."**
Sth. Seedsman 1953 : **16** : No. 2 : p. 34.

A new sweet corn hybrid bred by the Corneli Seed Co., St. Louis, Mo., has been named Prosperity. It is highly productive, tending to produce two ears in place of one. The bright yellow kernels are tender and of good flavour.

2289 Andrew, R. H.
The influence of depth of planting and temperature upon stand and seedling vigor of sweet corn strains.
Agron. J. 1953 : **45** : 32–35.

Experiments were carried out on the effects of depth of sowing and temperature upon the stand and seedling vigour of two single hybrids and their inbred parents. The inherent inability of the first internode to elongate was a major factor contributing to the poor stands of one inbred, when planted deeply in soil tests.

2290 Haskell, G.
The control of inter-pollination between sweet and flint corn.
Ann. Bot., Lond. 1953 : **17** : 81–93.

In a plot of equal numbers of sweet corn and flint maize individuals planted at the John Innes Horticultural Institution, the amount of cross pollination was measured by the number of starchy (*Su*) grains on sweet corn (*su*) ears. Such factors as dates of silking and tasselling only partially accounted for the observed variation in contamination. It is therefore postulated that the low percentage of outcrossing may be due to a genetical factor which gives *su* pollen a selective advantage over *Su* pollen on *su* styles.

2291 Haskell, G.
Genetics of cold tolerance in maize and sweet corn seed.
Heredity 1952 : **6** : 377–85.

Dent maize and sweet corn inbreds introduced from New Haven, Conn., showed a lower percentage germination than reciprocal maize x sweet

corn hybrids in soil kept at 50° F at the John Innes Horticultural Institution, England. Similarly, in field trials at Merton, Surrey, hybrids usually proved more tolerant of cold soil during germination than their inbred parents. Hybrid vigour was not alone responsible for improved germination, however, as maize x sweet corn hybrids showed greater cold tolerance than sweet corn x maize hybrids. The influence of starchy (*Su*) and sugary (*su*) endosperms on cold tolerance was also studied, but it was found that starchy and sugary grains produced on the same ear of a dent maize plant were equally tolerant of cold soils. It is considered that the pericarps, which were all of the maternal dent genotype, determined the reaction to environmental conditions. Hybrids from the reciprocal cross produced grains with sweet corn pericarps which had been selected for their tenderness and consequently allowed pathogens to enter or enzymes to leach away, thus reducing the percentage germination.

Early maturing hybrids with improved cold tolerance can, therefore, be introduced in England, although it may be necessary to grow the inbred parents elsewhere.

BOOK REVIEWS

Fisher, R. A. & Yates, F.
Statistical tables for biological, agricultural and medical research.
Oliver & Boyd, Edinburgh 1953 : 4th Ed. : 21s. : Pp. xi + 126 : 34 tables.

In a new edition, the first for five years, of this standard set of tables necessary for the serious statistical worker, a number of changes have been made and new tables added. Attention is particularly called to the errata to some tables of the former edition. The section of the introduction on dosage mortality tests has been re-written, and further modifications in the combinatorial solutions of Table XVII have been made. The new tables are: Table VIII3, a short table of significance levels for leading periodic components; Table VIII4, a "direct" table of the normal probability integral, which seems to have got itself well separated from its "inverse," Table I; Table XIV2, a table of "segmental functions" specifying the frequencies of non-recombinant and recombinant gametes in terms of the metrical positions of the centromere, a series of markers and the terminus of the chromosome arm; and finally two tables, XXXIII1 and XXXIII2, derived from the Random Numbers Table XXXIII and giving random permutations of 10 and 20 numbers respectively.

J. W.

Quenouille, M. H.
The design and analysis of experiment.
Charles Griffin & Co., Ltd., London 1953 : 36s. : Pp. xiii + 356 : tables.

This latest addition to the series of books now being published on experimental design from the statistical angle is to be welcomed, if only because what matters in this subject is well expounded within the compass of 350 not very large pages, including bibliography and all tables. Section A, of some 100 pages, deals with elementary principles, and, after a general introduction, describes the more straightforward types of trial, abandoning simplicity only to the extent of dealing with factorial designs and split plots. Only some 80 pages (Section B) are given up to incomplete block designs, but most of the types are described. An interesting Section C, of 65 pages, deals with long-term experiments, the planning of groups of experiments and the combination of experimental results. Lastly, Section D, of some 70 pages, has three chapters on experimental complications, dealing respectively with special designs and analyses, missing observations and the scaling of observations.

More emphasis is laid throughout this book on the purposes and interrelations of the different types of design than upon their analysis. While, therefore, it makes good reading, some may be driven to supplementary sources of information before they are able fully to understand what is expounded. This is particularly true of the standard statistical methods and tests, a knowledge of which is assumed.

J. W.

Brooks, C. E. P. & Carruthers, N.
Handbook of statistical methods in meteorology.
HM Stationery Office 1953 : Pp. viii + 412 : 129 tables.

Although intended for the meteorological worker, at least twenty out of the twenty-two chapters of this book are concerned with statistical methods of general adaptability and may well be turned to by the more general scientist seeking an insight into the application of these methods, and their application to numerical data. The material is up-to-date, and authoritatively set out. The scope of the book may be seen by the inclusion, in addition to the standard

topics, of sections on smoothing, interpolation and curve-fitting, and on time series, this last including harmonic and periodogram analysis, and the more modern "correlogram," as well as special topics. The book is self-contained in having the necessary statistical tables incorporated as appendices, and there are a considerable number of exercises for working by the reader, with answers provided.

J. W.

WAKSMAN, S. A.
Soil microbiology.
Chapman & Hall, Ltd., London and John Wiley & Sons, Inc., New York 1952 : 48s. : Pp. vii + 356 : 130 figs. : 77 tables.

Few branches of biological science show a greater complexus of interrelationship within a framework which is yet fairly distinct than that of soil microbiology. This field is here surveyed in a comprehensive although not completely exhaustive fashion. After a historical review of the progress in soil science during the past century, follow two descriptive chapters dealing with the nature of the microbiological population of the soil and with the techniques employed in its assessment. The bulk of the book falls into two sections, the first dealing in a thorough and well-presented manner with the chemical processes resulting from the metabolic activities of this population, and the second more with the ecological aspect of interrelationship between the microorganisms *inter se,* with higher plants and with forms of life in habitats other than the soil. It should be noted that the term micro-organism is used throughout in a broad sense, including larger fungi, nematodes and worms, thus giving the book a somewhat broader scope than that suggested by the title.

In a subject where popular oversimplifications are so prevalent this scientific presentation of the salient features of a relatively modern branch of knowledge which is still developing rapidly is of considerable value. In view of the highly complex nature of the subject, however, a greater clarity of style in certain sections and avoidance of repetition would have given the whole text greater readability.

The book is well and clearly illustrated on the whole, with an abundance of tables and figures. A few illustrations seem pointless however, particularly where labelling is inadequate.

R. H. R.

SRB, A. M. & OWEN, R. D.
General genetics.
W. H. Freeman & Co., San Francisco, California, USA 1952 : $5·50 : Pp. x + 561 : figs. : tables : plates.

The rapid advances that have been made in the last few years in genetical research, particularly on microbial genetics, have rendered many of our standard genetical text books out of date. The new text book by Srb and Owen is not open to any such objection. Setting aside the somewhat pedantic historical approach favoured by some earlier works, this book provides a very comprehensive survey of the present field of genetical research; and most recent developments, in particular those in Great Britain and the USA, are duly mentioned.

The arrangement of topics is intended to reflect, as far as feasible, the logical structure of the subject. It is rather doubtful how far this intention is realized, but the order of presentation is, of course, not of great importance provided the exposition of each topic is adequate. What actually happens is that the authors, after a preliminary skirmish around the definition of genetics, proceed to outline the classical field of genetics, including a certain amount of material, such as that on life cycles, rather outside genetics as usually understood, and then follow up with chromosome aberrations, polyploidy and aneuploidy, mutation and cytoplasmic inheritance. A very heterogeneous series of chapters follows, covering sex determination, quantitative inheritance, mating systems and heterosis, biochemical genetics, embryology, the nature of the gene, two elementary chapters on population genetics, two chapters dealing respectively with plant and animal breeding, and a final cautious survey of human genetics. It is remarkable how much information the authors have managed to compress into their account and how few modern developments are omitted. Naturally the treatment of many topics is somewhat cursory; this is especially noticeable in such controversial issues as directed mutation, which is dismissed after three paragraphs devoted to the pneumococcal transformation.

The book is profusely illustrated, and the diagrams are usually clear and useful. There is a tendency, however, to introduce redundant figures, notably the diagram on p. 19 illustrating the archaic notion of blood as a genetic carrier. It is obvious that the authors have the undergraduate student constantly in mind. Each chapter concludes with "Keys to the significance of this chapter," and a series of graded problems ranging from school level to post-graduate. A useful list of references, each accompanied by a one-sentence synopsis, rounds off each chapter.

This text book could, with advantage, replace many of its staider predecessors; it is only to be hoped that the care lavished by the authors in

rendering the acquisition of genetics painless will not have dysgenic results in future generations.

BOURNE, G. H. & DANIELLI, J. F. (Editors).
International Review of Cytology. Volume 1.
Academic Press Inc., New York 1952 : $7·80 : Pp. 368 : Figs. : tables : plates.

Still another branch of biology has been made the subject of an International Review, which is designed to appear annually and takes its place beside the others in this deservedly well-known series. The new recruit is Cell Biology, which is to treat cytology in its broadest aspects, including morphological and chemical studies of both cells and tissues. The first volume is truly international, including contributions from British, American, Dutch, Danish and Swiss authorities. The opening essay is, appropriately, a review of *Some historical features in cell biology* by A. Hughes, who points to some lessons that modern investigators might draw from workers in the past. In *Nuclear reproduction*, C. L. Huskins presents evidence supporting the concept of the gene as made up of identical lamellae and on variation of the constitution of different cells in an organism as regards their chromosomal and possibly even genic constitution. K. A. Bisset, in *Bacterial cytology*, gives a general picture of the present state of knowledge concerning the bacterial cell and nucleus. A. D. Hershey, in *Reproduction of bacteriophage*, discusses the growth of phage and defends the partial replica hypothesis which envisages the phage particle after entering the cell as breaking down into a two-dimensional fabric of monomolecular thickness before replication can begin. In *Structural agents in mitosis*, M. M. Swann describes changes in birefringence that occur during mitosis, and presents evidence that they are associated with the release from the chromosomes of chemical agents, which may, it is suggested, be nucleic acids. Other subjects to which essays are devoted include *Enzymic capacities and their relation to cell nutrition in animals* by G. W. Kidder, *Enzymatic processes in cell membrane penetration* by T. Rosenberg and W. Wilbrandt, *The folding and unfolding of protein molecules as a basis of osmotic work* by R. J. Goldacre, *The electronmicroscopic investigation of tissue sections*, by L. H. Bretschneider and *The histochemistry of esterases* by G. Gomori. The volume, though not free from minor inaccuracies, especially in the first essay, is well and attractively printed on excellent paper and is provided with useful author and subject indexes.

FREY-WYSSLING, A.
Submicroscopic morphology of protoplasm.
Elsevier Publishing Co., Ltd., Amsterdam, London and New York 1953 : 3rd. Ed. : 55s. : 32 tables : 181 figs.

The first edition of Professor Frey-Wyssling's *Submikroskopische Morphologie des Protoplasmas und seiner Derivate* was published in Berlin in 1938 and the second edition appeared in the form of an English translation in 1948. The third edition now appears as an English translation by May Hollander. Since the publication of the first edition in 1938 the use of the electron microscope has been introduced and much of what at that time was the fruit of deduction and intelligent speculation has now been either confirmed, refuted or substantially corrected by the results of actual observation. A great deal of this new knowledge has been incorporated in the new edition of the book, which therefore gives an authoritative picture of what the writer now believes to be the ultimate structure of living protoplasm, and also of the more simple colloidal molecules which lead up to it, on the one hand, and the more specialized products derived from it, such as cell walls, starch grains, muscle and nerve fibres, on the other. The result is a very plausible and unified system, although the author himself is the first to admit that some of the most fundamental problems, such as that of morphogenesis, remain as enigmatic for submicroscopic morphologists as they were for microscopic cytologists. The decisive concept in his theory is that of enmeshing strands; when these are asymmetric polypeptide chains a complicated interplay of homopolar, heteropolar and long-range "junctions" can account for the curious colloidal properties of protoplasm, which alternates from the sol to the gel with the utmost ease; "the protein thread molecules," as the author puts it, "are constantly forming new combinations and side bonds, while others are continually being broken down." At the submicroscopic level it accounts for the structure revealed by the electron microscope and for the characteristic features of fluidity, plasticity and elasticity of the cytoplasm. This reticular structure is shared by the resting nucleus, the chromosomes and even the chromomeres, and the gene is envisaged as a structure very much like that of an enzyme, consisting of a carrier (pheron) and one or more chemically active regions (agon) of

much smaller dimensions. This concept would, it is pointed out, explain certain phenomena such as polypheny and polyallely. The nucleic acids, far from being the hereditary substance, are regarded as bodies of relatively uniform chemical constitution which "screen off" the operative groups at certain periods such as nuclear division.

The view of protoplasmic structure presented is in consonance also with what is known of the constitution and growth of cell walls and other organs; the electron microscope reveals that the cell wall elongates not by extension, as formerly supposed, but by bipolar tip growth, which produces a system of interwoven microfibrils; these arise simultaneously in the thin internal wall and the thick external wall of a cell such as an epidermal cell, which is taken as indicative of the operation of "unknown morphogenetical principles inherent in the cytoplasm" rather than the mere interplay of simple physico-chemical forces. The intense metabolic activity that accompanies these processes points also in the same direction.

This is a stimulating book, and, considering that it is an English translation, published in Holland, of a German text, is singularly free from typographical inaccuracies such as rations for ratios on p. 9, hydropobic on p. 252, or sentences such as "it is the pairs of cross striae which adsorbs more easily silver" that occurs on p. 349. It is also printed on excellent paper and contains a bibliography covering some 25 pages.

Fuller, H. J.
The plant world.
G. G. Harrap & Co., Ltd., London 1953 : 2nd. Ed. : 30s. : Pp. xiv + 769 : figs.

The most outstanding feature and the value of this elementary text book of botany lie in the author's remarkable power of condensation. While remaining more genuinely an elementary text book than many others which so style themselves, a very comprehensive range of matter is brought within a narrow compass. The plan followed is the usual one, the structure, physiology and reproduction of angiosperms being followed by a broad survey of the main systematic groups of the plant kingdom. The survey differs from the usual procedure in that a general picture is given of each group as a whole, followed by a more detailed consideration of representative members. A final chapter on evolution is well written; here, as elsewhere, the author presents a balanced account of conflicting theories and makes no bones about pointing out gaps in the present state of knowledge.

One may be tempted to criticize the brevity with which certain topics are treated, such as most aspects of plant physiology, but the bibliography which follows each chapter will make good such omissions for the interested reader. Physiology, generally, is well related to morphology and anatomy, and the section on respiration may be cited as a particularly good instance of a simple, concise, yet comprehensive statement of present-day knowledge of the subject.

Topics generally omitted from text books of this type, such as plant hormones, and their applications in agriculture, and the use of radio-active isotopes in the study of plant nutrition, find a place and render the book less stereotyped and of greater interest to the elementary student, as well as making it a sounder preparation for more advanced study. It is to be regretted, however, that more idea is not given of methods of scientific investigation and that experimental data are so lacking. What lengthening of the text their inclusion might involve could be made good, in part at least, by the omission of the sometimes lengthy summaries given at the end of each chapter. These seem to be little more than an aid to the crammer and are hardly necessary in a book so concisely written. The copious illustrations deserve especial mention. Drawings are of exceptional clarity and photographs of quite outstanding merit.

R. H. R.

Esau, K.
Plant anatomy.
Chapman & Hall, Ltd., London and John Wiley & Sons, Inc., New York 1953 : 72s : Pp xii + 735 : figs. : tables : 85 plates.

This straightforward and comprehensive account of the anatomy of seed plants is outstanding for its clarity of presentation. It is intended for advanced students and for teachers, but will be a valuable work of reference for elementary students also.

Although largely descriptive in approach, theoretical considerations are widely touched upon, although no problems are solved. The major concepts relating to the tissues and organs treated are stated in broad outline at the commencement of each chapter, at the end of which necessary references for further study are included in extensive bibliographies. The main text is wisely abstemious with regard to matters of speculation, particularly with respect to theories of homology, which are regarded rather as convenient pegs on which to hang the information given. Developmental aspects receive

prominence throughout, and phylogenetic considerations are also mentioned, particularly in connexion with vascular anatomy. The relation of structure to function is treated as briefly as is compatible with proper appreciation of anatomy.

The subject matter is presented in an orthodox sequence; after a consideration of the plant cell and the nature of meristems, the various tissues are treated in turn, followed by the organization of the principal plant organs. The final chapters on flower, fruit and seed are approached, states the author in her preface, "with a feeling of adventure," purely anatomical considerations merging into morphological studies on the one hand, and the phenomena of reproduction on the other.

A noteworthy feature is the treatment of terminology which leaves no ambiguities; precise definitions are given of terms as used in the text as well as mention of the sense in which they are employed by other authors.

Being an elegantly produced volume at a price well beyond the reach of most students, it is to be regretted that the interests of economy have led to the relegation of its superb collection of 85 plates to the back of the book, where they will be so much less readily consulted.

R. H. R.

Good, R.

The geography of the flowering plants.

Longmans, Green & Co., Ltd., London 1953 : 2nd Ed. : 50s. : Pp. xiv + 452: 75 figs. : 16 plates : 9 maps.

The first edition of this book, which was published in 1947 and reviewed in *PBA*, Vol. XVIII, p. 399, had been prepared for the press in 1939, and claimed only to represent the state of knowledge at that time. In this second edition, the author has endeavoured to bring the whole of the subject matter up to date. Some parts have been largely rewritten, notably chapter 4 on the distribution of families. Here it is pointed out that no particular system of classification has been followed, it being felt that it was desirable to refer to as many families as seemed reasonable in a geographical study. Consequently nearly 400 are mentioned, including all those recognized in the four most familiar classifications of Bentham and Hooker, Engler, Hutchinson and Lemée. The last authority constitutes an important source of information in this second edition.

The scope of the book remains unchanged except for the inclusion of new material where relevant, which has resulted in a slight lengthening of the text. Minor improvements in illustrations and bibliography have been made and a subject index has been added.

R. H. R.

Brooks, F. T.

Plant Diseases.

Oxford University Press, London 1953 : 2nd Ed. : 38s. : Pp. xii + 457 : 62 figs.

On his retirement from the chair of Botany in Cambridge University, Professor F. T. Brooks devoted much of his well-known energy to writing the second edition of his *Plant Diseases*. While regretting that he did not live to see its publication we must be grateful that he was able to complete the manuscript and that three of his former pupils and colleagues in the Botany School saw it through the press. With characteristic thoroughness Professor Brooks has condensed the present knowledge about plant diseases and this publication will prove to be extremely useful to both students and research workers.

In the preface, written shortly before his death, Professor Brooks explained that "the first edition has been completely rewritten, so that the present one is virtually a new book." The increase in knowledge since the publication of the first edition in 1928 has inevitably resulted in the present volume being larger than the former one. This increase may be gauged by the fact that the full and accurate index now occupies 31 pages, whereas there were but 18 before. The general presentation of the material, however, remains the same and the illustrations are mainly unaltered so that the present book is a modernized version of the first.

By far the greater part of the book deals with diseases caused by fungi. These 13 chapters are introduced by a chapter on the general characteristics of fungi and their classification. This classification includes only groups in which pathogenic species occur. As in the first edition there is a brief description of the causal organism before the information on the disease is given and this is set out with accuracy, brevity and clarity. There is a wealth of references, and these literature lists, culled from a wide field, will be of the greatest value.

Specialists on diseases caused by viruses and bacteria may consider the chapters on them inadequate but the general pathologist will find them of use, especially as a guide to further information. There is also a chapter on non-parasitic diseases which the author admits is a mere introduction to the subject and which deals only with the better known physiological disturbances. It is however, praiseworthy, that in these days of expensive publication the author

should have attempted to cover the whole field of plant disease in one volume.

Finally the book closes with a chapter summarizing information on fungicides. Information on this subject is often required in a hurry and it is valuable to have such a summary readily available and to have instructions on the preparation and application of these substances.

Professor Brooks had a large family of former students scattered over the globe. These, and others, knew that whenever they asked for his help there was immediately available to them his encyclopedic knowledge of plant diseases and the literature pertaining thereto. Though he can no longer be consulted we are not without an inheritance for he has bequeathed to us his knowledge in this new edition of *Plant Diseases*.

M. A. K.

MORTON, J. F. & LEDIN, R. B.
400 plants of South Florida.
Text House Inc., Coral Gables, Florida 1952 : $3·50 : Pp. 134 : 27 plates.

These deliberately nontechnical but authoritative descriptions of exotic and native ornamentals and notable wild plants of southern Florida are intended primarily for visitors bewildered by the variety of vegetation. The concise information includes references to poisonous properties, medicinal uses or other interesting characteristics. The descriptions are arranged alphabetically in order of Latin names; popular common names are also included in the index so that quick reference is possible. In comparing this volume with *Fifty tropical fruits of Nassau* by Morton and Morton (cf. *PBA*, Vol. XVIII, p. 184), recently reissued to conform with the Florida Nature Series, it is felt that there are too few pictures. Only 28 plants have been selected for illustration. Many of the full page drawings are delightful and would certainly be of help in identification. If more drawings were included, both the attractiveness and value of the volume as a book of reference would be greatly enhanced. Thoughtful consideration has been given to the well-being of both reader and book, for a tinted paper recommended to reduce eye strain is used throughout and the binding is resistant to mildew and vermin and may be cleaned with a damp sponge.

Directory of activities of the Bureau of Plant Industry, Soils, and Agricultural Engineering 1952.
US Dep. Agric. Handb. 1952 : No. 47 : 40 cents : Pp. 131 : 1 map.

This pocket-sized directory supersedes a similar one published in 1947 (cf. *PBA*, Vol. XVIII, p. 830). Like its predecessor, it includes brief accounts of the history and functions of the bureau, and a map showing the locations of the field activities. For each station, information is given concerning the leading personnel, research projects and divisions in charge. The directory provides a handy guide to investigations on crop breeding and genetics.

28e beschrijvende rassenlijst voor landbouwgewassen met bijlagen 1953. (**Twenty-eighth descriptive list of agricultural crop plants, 1953**).
Rijkscommissie voor de Samenstelling van de Rassenlijst voor Landbouwgewassen, Wageningen 1953 : Pp. 324 : tables.

The new edition of this compendious and highly useful publication, issued by the Dutch Government Committee for the Compilation of the List of Varieties of Field Crops, has now been published (cf. p. 164 above) with its English commentary.

The present edition contains not only all the usual information its readers have come to expect, but information on Dutch legislation on the rights of breeders over the varieties produced by them.

Breeders, growers and others who use this reference book will have recognized the value of the list of English and foreign synonyms of varieties. This list now comprises synonyms for 2 varieties each of wheat and of barley, 1 of rye, 6 of oats, and 14 each of potatoes and of forage beets. The Wageningen Committee intends in the future to increase the number of synonyms listed and any additional equivalents of varietal names will be received with gratitude by the Committee whose chairman is Prof. Dr. Ir. J. C. Dorst. It is to be hoped that any who have such information will collaborate in this way to assist the Committee which is doing such a useful work for breeders and farmers in Holland and other countries.

Veröffentlichungen der Arbeitsgemeinschaft für Forschung des Landes Nordrhein-Westfalen. Heft 10. (**Publications of the Research Association of the North Rhine-Westphalia Territory. No. 10**).
Westdeutscher Verlag, Köln and Opladen : 1951 : DM 6·80 : Pp. 70 : figs. : tables : plates.

The tenth volume of this series contains the texts of two lectures, the initial one being by Prof. Dr. H. Braun of the University of Bonn,

on *Möglichkeiten und Grenzen der Resistenzzüchtung* (*Possibilities and limits of breeding for resistance*). In his lecture Prof. Braun attempted to assess the present position of breeding resistant varieties of agricultural plants and the hopes for the future.

Rust-resistant wheat in America, wart-resistant potatoes in England and Germany, blight-resistant potatoes in Germany and mosaic-resistant sugar cane in Java were named as examples of successful breeding for disease resistance. The concept of biological specialization was elucidated, and examples were given of the origin of new biotypes capable of attacking hitherto resistant varieties, or of withstanding hitherto effective fungicides. There follows an explanation of how new biotypes may arise through sexual reproduction or by mutation, and be selectively multiplied if they attack a variety that was resistant to the initial race. It is finally concluded that the greatest success a breeder can hope for is to keep a few steps ahead of the parasite.

WEIJER, J.
A catalogue of genetic maize types together with a maize bibliography.
Martinus Nijhoff N.V., The Hague, 1952 : 22 Guilders : Pp. 189–425.

This catalogue has been compiled as a result of the suggestion and financial aid of the Department of Natural Sciences of UNESCO. Part I provides an alphabetical list of genes with summaries describing their phenotypical effects, and with references to the News Letters of the Maize Genetics Cooperation, Cornell University, and to the bibliography in part II. The bibliography contains 3850 entries. The key index in part III, with its well selected subjects, makes the information immediately accessible. The inclusion of the references to all the Maize Cooperation News Letters is an especially valuable feature. In his introduction, the compiler states that in addition to this catalogue of genes, a similar one of genetic strains, not included in this publication, has also been produced; further information may be obtained from the Genetical Institute of the Government University at Haren, Groningen, Netherlands. The author concludes his foreword with the words: "So be sure, the compilation of this catalogue has not been a very exciting job, but we hope that it will serve some useful purpose." He can be assured that the well-arranged results of his Herculean feat of bibliographical labour will be of great value to all geneticists and breeders interested in maize.

The production of barley for malting. Monographs on malt and malt products.
Muntona Ltd., Bedford : Edward Fison, Ltd., Ipswich 1953 : Pp. 26 : 1 graph.

Intended as a short popular introduction to the production of malting barley in Britain, this booklet provides a simple account of the different stages of the life cycle of the barley plant, germination in relation to the requirements of the maltster, cultural practices, and improvement of the crop by breeding. The complexity of breeding malting barley is stressed, and importance is attached to the possibility of achieving improvements by the artificial induction of mutations, or by hybridization between Scandinavian barleys and standard British varieties to secure selections with the advantages of the former but the characteristics required by British maltsters and brewers, as in the case of the recently developed Proctor (cf. Abst. 1180). Appendices provide a bibliography, brief descriptions of varieties of malting barley, and an elucidation of extract value and market value for brewing.

HAARER, A. E.
Jute substitute fibres.
Wheatland Journals, Ltd. 1952 : Pp. xxi + 185 : 13 figs. : 24 tables : 53 plates.

Since the early nineteenth century world trade has relied on the production of jute fibre, for strong sacking, from *Corchorus capsularis* and *C. olitorius*, grown cheaply in eastern Bengal and the Ganges delta. As jute cultivation to meet increasing demands has promised success only in British Guiana and the Amazon region in Brazil, commercial interest is now focussed on the exploitation of substitutes adaptable to tropical areas seeking to widen their bases of economy. It is with the three most promising substitute fibres, Bimplipatam jute (*Hibiscus cannabinus*), roselle (*H. Sabdariffa*) and aramina (*Urena lobata*), that the author is concerned. He has had long experience of tropical agriculture in East Africa and has collected a large amount of information on the botanical characteristics, distribution, climatic and cultural requirements, uses of fibre and seed, harvesting, retting, extraction, and selection and breeding of these plants. Each species is considered in a separate and well illustrated section. A terminal bibliography provides access to original papers. Appendices enumerate economically important diseases and pests, mention other useful fibre plants and compare the advantages of the three main jute substitutes, indicating the possibilities

of improvement by further selection and hybridization. The author also emphasizes that mechanized harvesters and strippers will contribute largely to commercial success in many countries and he advances schemes for organizing the industry so that retting centres may be worked economically throughout the year.

BANGA, O.
5e beschrijvende rassenlijst voor groentegewassen (inclusief vroege aardappel, aardbei, tabak, geneeskrachtige en aromatische kruiden). [**Fifth descriptive variety list for vegetables (including early potatoes, strawberries, tobacco, and medicinal and aromatic herbs**)]. Inst. Vered. Tuinbouwgewassen, Wageningen 1953 : f. 1·75 : Pp. 180 : figs. : tables.

For a general review of the contents and merits of this highly useful list, issued by the Institute for the Breeding of Horticultural Plants at Wageningen, readers are referred to *PBA*, Vol. XXII, p. 318. The present volume contains descriptions of 470 varieties belonging to 60 crop plants. Tobacco is represented by 13 varieties, while the medicinal and aromatic herbs number 22.

In addition to the alphabetical index of varieties and crops, in which heavy type is used to indicate species or varieties whose Latin equivalents are given in the text, the actual text itself has now been arranged in alphabetical order by the common name of the crop, which also appears as an indicator (in heavy capitals) at the top right or left hand corner of the pages of the text. Thus the information on any crop can be quickly found without having always to consult the index.

The varieties are classified, by use of initial letters before the proper names, as: (1) "generally recommended"; (2) "recommended with limitations"; (3) "unimportant," (i.e. of recognized, though very limited, use); or (4) "new." The class "new" includes, as well as new varieties, some others still little known in the Netherlands. Once again the list can be heartily recommended to horticulturists, agricultural advisory staff, educationalists, and agricultural libraries in Holland and other countries.

NEW JOURNALS

Acta Microbiologica Polonica.

This new quarterly, issued by the Polish Society of Microbiologists, is devoted to microbiology in general, and as applied in agricultural and industrial fields.

The subjects dealt with in volume 1 include: antibacterial substances, fungicides and antibiotic extracts from lichens; the chemistry and microbiology of soils; physiological studies of papilionaceous plants, peas, serradella, lucerne, soya bean and lupin, inoculated with *Rhizobium*; biochemistry of the thiobacteria; yeasts in fodders; and the effect of selenium on the carbohydrate metabolism of *Escherichia coli*. For other subjects treated cf. Absts. 1718 and 1730.

Hungarian Agricultural Review.

This periodical of the Hungarian National Agricultural Library provides English abstracts of Hungarian papers on breeding and other aspects of agriculture, horticulture and forestry. The address of the editorial offices is Attila-utca 4, Budapest I.

The Pakistan Cotton Bulletin.

The bulletin is published monthly by the Pakistan Central Cotton Committee; it is intended primarily as a source of information for the grower, ginner and trader. Part I contains articles on a wide range of subjects, including cotton breeding; part II provides tables of economic statistics. Further information may be obtained from A. I. Siddiqi, Secretary, Pakistan Central Cotton Committee, Block 59/2, Pakistan Secretariat, Karachi.

Potato News from the Netherlands.

This popular publication is issued by the Foreign Progaganda Commissions for Seed Potatoes and Ware Potatoes, with the collaboration of the Netherlands Ministry of Agriculture, Fisheries and Food. The periodical appears in English, French, German, Spanish, Portuguese and Dutch. It contains copiously illustrated articles on the various aspects of potato production and utilization, including occasional accounts of Dutch varieties and breeding. It may be obtained free by applying to the following address: Sweelinckplein 45, The Hague.

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